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THE

FIRST LINES

OF THE

PRACTICE OF SURGERY;

DESIGNED

AS AN INTRODUCTION

FOR

STUDENTS,

AND

A CONCISE BOOK OF REFERENCE

FOR

PRACTITIONERS.

WITH COPPER PLATES.

THE THIRD EDITION,

THOROUGHLY REVISED, CAREFULLY CORRECTED, AND CONSIDERABLY ENLARGED;

BY SAMUEL COOPER,

MEMBER OF THE ROYAL COLLEGE OF SURGEONS IN LONDON; AUTHOR OF
THE "DICTIONARY OF PRACTICAL SURGERY;" &c.

LONDON:
PRINTED FOR LONGMAN AND CO., PATERNOSTER ROW; S. HIGHLEY AND SON,
24, FLEET STREET; J. CALLOW, 10, CROWN COURT, PRINCES STREET,
SOHO; E. COX, ST. THOMAS'S STREET, BOROUGH; T. UNDERWOOD, 32,
FLEET STREET, AND 40, WEST SMITHFIELD; A. BLACK, AND W. BLACKWOOD, EDINBURGH; AND J. CUMMING, DUBLIN.

1813.

C. Baldwin, Printer,
New Bridge-street, London.

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DEDICATION.

TO

WILLIAM LONG, ESQ.

F.R.S. F.A.S.

(Late Surgeon to St. Bartholomew's and Christ's Hospitals.)

DEAR SIR;

WHEN an author is about to dedicate his work, he is generally anxious to select a patron, to whom he is indebted for acts of kindness, whose name will be an honour to the book, and whose knowledge of the subject treated of, qualifies him to be a judge of what is written. It was on all these accounts, that I was induced to request the favour of being permitted to inscribe this volume to you, who have shewn me friendship on a variety of occasions, and are, I firmly believe, as much respected and esteemed as any man whatsoever in the numerous profession, of which you are a distingished member. Improved, as the book has now been, by repeated revisions, I presume to indulge a hope, that it will be found more deserving, than it formerly was, of the honour your name confers upon it;

and that you will at least view, in a favourable light, an undertaking, the design of which must be laudable, though the execution may be, from its difficulties and my own incompetency, exceedingly imperfect.

That you will ever take a warm interest in every thing, relating to the prosperity of surgery, is what cannot be doubted by any body, who has marked the zeal and integrity, with which you constantly fulfilled your public professional duties; and that you may long live to enjoy this noble and benevolent feeling, must be the general wish of all, who have the honour of your acquaintance, and is, in particular that of

Your most obliged, faithful,
and devoted Servant,
SAMUEL COOPER.

South Crescent, Bedford-square,
June, 1812.

PREFACE

TO THE

THIRD EDITION.

WHEN I first entered into the profession of surgery, I naturally made inquiry after an approved introductory book upon the subject, and was not a little surprised to find, not only that no such work existed in the English language, but, that we had no larger compendium, which embraced the modern principles, and latest improvements. Heister's system, which was translated many years ago, besides being too prolix for an introduction, contained much old exploded and erroneous matter, and remained unenriched with any of the important innovations, which had been made since the time of that elaborate writer. Benjamin Bell's system (to say the best of it) was not corrected to the present state of surgery, and, of course, delivered much wrong advice, and omitted to mention numerous interesting changes, as well in theory as in practice. Mr. Latta, indeed, had published a general treatise on surgery, a few years before the "First Lines" were undertaken; but, his book can only rank as a careless compilation, injudiciously enlarged with details of too many cases materially alike. Mr. Latta was also an author, by no means well qualified for what he attempted, inasmuch as his principles and practice are far from being generally the best; he is always more fond of assertion than argument; and, (what is worse) he has not availed himself of the observations and opinions of any of the numerous distinguished foreign surgeons, from whose writings a large store of most valuable information might have been collected. This last objection would also lie against Mr. B. Bell; for, I hold it to be an essential duty, in the author of a general treatise on surgery, to pay attention to the sentiments of other writers, and, on difficult and contested points, never to offer a judgment without due attention to the weight of authority, and the evidence of recorded facts. In short, at the time, when I formed the design of publishing the "First Lines of the Practice of Surgery," there was, (as I have already observed) no general work on surgery, which could be advantageously consulted for modern information.

The opportunity, therefore, seemed to me highly favourable for the publication of an elementary treatise, in which all the new leading facts, the most rational theories, the principal symptoms of surgical diseases, and the chief methods of treatment, were clearly and impartially explained. It even occurred to me, that a work of this kind, if executed with only moderate success, might be one, from which grea utility would be derived; and, in putting my materials together, I was determined to keep in mind, that the busy practitioner, little disposed to waste his time in the perusal of speculative conjectures, was always solicitous to find in the chapter, to which he referred, a short statement of the most interesting practical circumstances, separated from all hypothetical disquisitions.

How far the design has been fulfilled, and whether the work has been found truly useful, are questions, which it is not for me to answer. If the book has not been of real service, in diffusing and promoting surgical knowledge, I regret, as much as any body can do, that it did not issue "still-born from the press," and that it was ever honoured with an extensive encouragement, of which it was in fact unworthy. If, on the other hand, I could feel certain, that it has really assisted the student and young practitioner, and been the means of promulgating valuable information, I should experience an inward gratification, which would be of itself an ample recompense for the time and pains, that have been devoted to the undertaking.

That the work, however, has recommendations, I am inclined to hope, not only from the vast patronage that has been conferred upon it, but, more particularly, on account of the approbation, which, I am informed, those eminent professors, Dr. J. Thomson, of Edinburgh, and Mr. Astley Cooper, of London, have been pleased publickly to express of it in their respective lectures. That any publication of mine should have been honoured with the commendations of two gentlemen, so deservedly exalted in the profession as they are, and, for whom, as being two zealous and able promoters of the improvement of surgery, I have long entertained sincere respect, will always be to me a reflection of the most pleasing description.

With regard to the plan of this work, it is exceedingly simple. The first part contains *General Surgical Subjects;* or, in other words, such disorders as are common to several situations in the body. The second part comprehends *Particular Surgical Subjects*, by which are implied, the disorders and injuries of each particular part, and the operations practised upon it.

I have found it convenient, however, to deviate from this plan, in the following respect: in treating of aneurisms, polypi, &c. I have included in the first part of the book the polypi, and aneurisms of particular situations. It seemed to me better to finish at once subjects like these, and place their different parts together, than to make several chapters of them, and put some of these in the first, and others in the second, part of the book.

The two preceding editions consisted of not less than five thousand copies, exclusively of others, which have been printed in America. Notwithstanding this extraordinary number of impressions, the work is already once more out of print, and another opportunity has been afforded me of making improvements, and additions.

It only remains for me to observe, in relation to this third edition, that no pains have been spared to render the work more correct, and more instructive. Several new chapters have been inserted; many of the former ones have been re-written; and numerous important alterations have been made throughout the whole publication.

Mr. Hunter, in whom the love of truth often induced changes of sentiment, has been absurdly censured, because he used occasionally in his lectures to warn his pupils not to write down his observations, since what was his opinion to-day, might not be so to-morrow. So, with respect to this book, I wish not the student to put implicit belief in every opinion, that is at this moment countenanced in it. Many of the sentiments, which I formerly professed in it, I have now found reason to alter; and many things, which I at present suppose to be correct, I may hereafter have cause to expunge, as unfounded and erroneous. Every man should think for himself, and receive each observation, that he reads, only as a proposition, to which his own reflections are to be directed. Surgery, improved as of late years it has been, is still in a progressive state of improvement; scarcely a year passes without new operations and new methods of treatment, forming the subject of experiment; and discoveries are taking place, from time to time, which either gradually or suddenly, work important changes in the whole fabric of surgical knowledge. Hence, however good a treatise on surgery may now be, the nature of the subject absolutely demands, that occasional revisions, corrections, and additions, be made to the publication, in order that this may keep pace with the actual progress of the science.

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FIRST LINES

OF THE

PRACTICE OF SURGERY.

PART I.

GENERAL SURGICAL SUBJECTS.

CHAP. I.

INFLAMMATION.

Every surgeon, desirous of shining in his profession, should endeavour to make himself acquainted with the nature of inflammation. Indeed, this is naturally the first subject for consideration; for, local inflammation is so frequent an occurrence, that there are few chirurgical diseases, in which it is not concerned, either as a cause, a symptom, a complication, or, even as a means, or mode of cure.

Putting out of consideration chronic cases, Mr. Hunter defines inflammation to be a process occasioning, in a given time, and from one immediate cause, the following local effects; viz. pain, swelling, and redness.*

Inflammation is either acute, or chronic; simple, or complicated with disease. Acute, healthy inflammation is often termed *phlegmon*. The morbid inflammations are as numerous as diseases themselves; erysipelatous, venereal, scrofulous, vaccine, variolous, &c. &c.

The symptoms of phlegmon are preternatural redness, increased heat, tension, and a circumscribed, throbbing, painful tumefaction of the inflamed part.

The bright redness in the centre of the swelling is gradually lost at the circumference, in the natural colour of the skin. The red appearance undoubtedly arises from the dilatation of the small vessels, which become sufficiently capacious to admit the red globules in large quantities. It may also partly depend, in some instances, on the generation of new vessels. However, it must be acknowledged, that, in many instances, it comes on so quickly after the operation of the exciting cause, that the shortness of the time will not allow us to suppose, that any change, like that of the formation of new vessels, can have taken place. In burns, and scalds, in particular, the redness frequently appears almost the very moment after the occurrence of these injuries.

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*Treatise on the Blood, &c. p. 250.

The dilatation of the vessels, and the consequent appearance of redness, may be seen taking place in many cases of ophthalmy: vessels, which naturally hold only a colourless fluid, not only shew themselves in myriads on the conjunctiva, filled with red blood; but, even on the transparent cornea, ramifications, distended with the same fluid, are quite conspicuous.

The swelling and tension seem referrible: 1. To the dilatation of the vessels; 2. To the plethoric state of the arteries and veins; 3. To the exudation of coagulating lymph into the interstices of the cellular substance; 4. To the interruption of absorption.*

With regard to the augmentation of heat in inflammation, it appears from Hunter's experiments, that the temperature of the part affected is not raised nearly so high as one might suppose from an abstract consideration of the patient's feelings. Let us remember, that the sensibility of the nerves is augmented, and we shall no longer be surprised, that they should convey to the sensorium false impressions.

It is more easy to conceive, than describe, how any deviation from the natural state of parts must excite pain. It is, perhaps, the unusual condition, into which the nerves are thrown, which may be regarded as the proximate cause of pain. In chronic inflammation, the graduality of the change allows the nerves to become adapted to it, and the degree of pain only amounts to a dull, uneasy sensation; but, in phlegmon, the change being quick, the pain is considerable.

We shall presently find, however, that this theory may be erroneous, since an alteration in the sensibility of the nerves may be as much concerned in the proximate cause of inflammation, as any changes, or action of the arteries. Reason and observation seem scarcely to approve referring every thing exclusively to the blood vessels. Each kind of inflammation seems to have its particular sort of pain: thus phlegmon excites pain that is joined with a sense of throbbing and heaviness; erysipelas gives rise to a burning kind of pain; and anthrax causes a species of pain characterized by a sensation of stiffness.

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* Soemmering de Morb. Vasor. Absorb.

The throbbing manifestly depends on the strong pulsation of the arteries, and is often noticed to affect, not merely the ramifications exactly in the seat of the inflammation; but, also, the arterial trunks for a considerable extent before they arrive at the part affected.

Every considerable inflammation is always attended with more, or less, febrile disorder of the constitution, as will be explained in the following chapter. This fever is to be regarded, as an effect and consequence of the local affection, with which it invariably increases, or subsides.

CAUSES.

The remote, or occasional causes are exceedingly numerous; but, as they mostly rank in the class of external violence from mechanical, or chemical means, a full detail of them would be useless. Suffice it to say, that wounds, fractures, and other injuries; the lodgment of a thorn, or bit of glass in the flesh; an extravasation of urine; a severe bruise; a scald, or burn; the application of innumerable irritating substances to parts, &c. are common causes of inflammation. The irritation of fevers would often appear to be a remote cause. The idea, however, that the inflammation, thus occasioned, is critical, or, in any way conducive to the cure of the constitutional disorder, does not seem to be established on a tenable basis. Sometimes inflammation arises spontaneously, or, to speak more correctly, no perceptible cause can be assigned for it.

The proximate cause has been the subject of much unsuccessful disquisition. Galen, who attributed disease in general to certain humours in the system, referred phlegmon to a superabundance of the humor sanguineus. Boerhaave ascribed the proximate cause to an obstruction in the small vessels, occasioned by a viscosity, or lentor of the blood. Cullen, and others of the modern school, with more reason, refer it rather to an affection of the vessels, than a change of the fluids. Were we to suppose the state of the whole mass of the blood to be the cause, why should inflammation be confined to any particular situation? In inflammation a larger quantity of blood is impelled into the part affected, than in the natural state. If an incision were made into an inflamed part, the blood would gush from the wound more profusely, and vehemently, than at another period. This circumstance cannot arise from any peculiarity in the action of the heart, an organ that drives the blood equally into the whole arterial system. The arteries are not mere mechanical tubes for the transmission of the blood to the various parts of the body; they possess, besides their elasticity, a vital power of action, arising from their muscular structure. It is impossible to explain rationally the augmented flow of blood through an inflamed part, except we regard it as the effect of an increased dilatation, and a more powerful contraction of such arteries, as lead and are distributed to the seat of the inflammation. It is this *increased action of the vessels, that is generally considered, in modern times, as the proximate cause* in question.

Although many lecturers and writers seem to consider this explanation as full and satisfactory, I have always entertained a different opinion. There must be something besides merely an increased action of the vessels;—there must also be something besides an enlargement of their diameters, to constitute inflammation. Both these changes happen to the external carotids in the growth of the stag's horn; in short, they always happen whenever there is any process going on in the animal body requiring an extraordinary supply of blood.* Still, there is no inflammation;—no pain. It has appeared to me, that inflammation is constantly present, when, with such increased action of the vessels, there is joined an augmented sensibility in the nerves of the part affected. Perhaps, therefore, we ought rather to consider as the proximate cause, the increased action of the vessels, and the increased sensibility of the nerves, together. But, there is no more reason in ascribing the proximate cause to an increased action of the vessels alone, than there would be in referring it exclusively to the augmented sensibility of the nerves. The vessels may suffer an increased action, without the existence of inflammation; and parts may be excessively painful without being in the least inflamed. But, after all, it appears to me, that the investigation of the proximate cause of inflammation is so abstruse and difficult a subject, that every suggestion concerning it is to be received with much doubt; both the increased action of the vessels, and the augmented sensibility of the nerves, may, in reality, be only effects; and, in being set down as a proximate cause, they may have had an undue degree of importance assigned to them.

Further Remarks connected with the Subject.

It has been the fashion to dwell too much on the existence of a spasmodic constriction of the minute extremities of the vessels in phlegmonous inflammation. Does not the extravasation of lymph contradict this hypothesis? Is not the visible enlargement of those vessels, is not the increased current of blood through the inflamed part, contradictory of this opinion? If we examine the ground, on which the doctrine rests, we shall find, that the suppression of secretion forms the chief argument in its support. But, in mild inflammations of secreting parts and surfaces, the secretion is generally augmented. In violent cases alone secretion is stopped; and we must infer, that there is then a constriction of those minute extremities of the vessels, which are concerned in that process. There is not the smallest evidence, however, in any cases, that such a constriction ever affects, either the venous extremities of the arteries, or those which are destined to deposit the new matter of the body.

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* See Hunter on the Blood, &c. p. 288.

A very striking circumstance, attending phlegmonous and other inflammations, wheresoever situated, is their being always most violent on the side next to the external surface of the body. When inflammation invades the socket of a tooth, it chiefly takes place towards the cheek, and not on the inside of the alveolary process.

The situation, position, structure, functions, and distance of the part affected from the source of the circulation, cause considerable variety in the progress, and termination of all inflammation.

Parts that enjoy a vigorous circulation of blood through them, can bear inflammation better, than others oppositely circumstanced. But vital parts, though exceedingly vascular, do not undergo inflammation favourably; because, as Hunter remarks, the natural operations of universal health depend so much on their sound condition.

The depending position of a part seems to have a bad effect on inflammation, probably, by retarding the return of blood.

New-formed parts possess less vitality, than such as constitute a portion of the original fabric of the body; and, consequently, they are very liable to be absorbed, or to mortify, when inflamed.

During the existence of inflammation, blood taken away by the lancet, has a particular appearance on its surface, termed the *buffy coat*, or *inflammatory crust*. This consists of a stratum of coagulating lymph, almost destitute of red globules. Blood in this state is often termed *sizy*. The colouring matter of the blood is known to be its heaviest part, and even to acquire (according to Hunter) an increase of weight in inflammation. During the existence of this latter affection, the part of the blood, named the lymph, after being received in a basin, coagulates with unusual slowness; and hence, perhaps, the heavy red globules have an opportunity to descend to a considerable depth from the surface, before they become entangled in the coagulum. It is also observed, that the coagulating lymph of blood, taken away in inflammation, coagulates in a very close manner, so as to squeeze out a larger quantity of serum from within its substance, than is compressed out of ordinary blood, when received in any vessel. Hence, the blood, taken away in inflammatory cases, usually forms a cake, which swims in an extraordinary quantity of serum. The surface of the buffy coat, or the upper stratum of the coagulating lymph, likewise assumes an appearance more or less concave, and has its edges drawn inward, from the sides of the basin in which the blood has been received.

The buffy coat is a greater criterion of the existence of inflammation, than even the state of the pulse itself. It is to be remembered, however, that there are a few anomalous constitutions, in which this appearance is always found. The blood, taken from pregnant women, has also the inflammatory crust.

TREATMENT OF INFLAMMATION.

Removal of the Cause.

From the foregoing account of inflammation, it is obviously a primary indication to lessen that immoderate action of the arteries, to which, in a great degree, the symptoms and effects are attributable. Whatsoever forms the remote cause, ought manifestly to be removed. If the irritation of a splinter should excite phlegmonous inflammation, who would not of his own accord extract the extraneous substance? But, the removal of the stimulus, exciting the process, will not put an immediate stop to it; for, the living solids seem to be endued with a sort of re-action. Hence, besides taking away (if possible) the occasional cause, it is proper to moderate by other means the increased vascular action.

BLEEDING.

We have noticed, that one principal effect of this increased action, is the transmission of a larger quantity of blood through the inflamed part. The propriety of endeavouring to diminish the flux of blood to the part, in most cases, cannot therefore be doubted. The chief mode of accomplishing this object ls by general, and topical bleeding. General bleeding is not so universally requisite as topical. Inflammation is a local affection, and must, therefore, particularly demand local curative means. But, when inflammation is situated in a part of such great importance, that it cannot undergo a certain degree of disturbance, without endangering life itself, we must not be content with local measures alone. Thus, when the brain, or lungs are inflamed, the affection must be speedily subdued, or death will happen.

Also, when the inflamed parts are endued with inferior powers of recovery, it is often necessary to have recourse to general, as well as topical bleeding; as in inflammation of a joint. When inflammation is situated in an organ, the functions and uses of which would almost inevitably be destroyed by suppuration, it is also advisable to moderate the local affection, even at the expence of the whole system. Ophthalmy is a case of this kind.

Bleeding is quite improper, when the inflammation and fever are trivial; when the patient is very feeble, or aged; and when the cause of the affection can be entirely removed.

The efficacy of bleeding is greater, the sooner it is practised; and the more suddenly the blood is evacuated. Bleeding near the part affected is usually more effectual, than in a remote situation. Topical bleeding can only prove powerfully efficacious, when general plethora has been previously removed; but, if no plethora, nor much fever should exist, it may have immense effect.

PURGING.

Mild purgatives of the saline kind, not only diminish the quantity of the circulating blood, by the increased secretion, which they occasion in the alimentary canal, they also operate specifically in lowering all the operations of the system, and must therefore tend to subdue inflammation. As they have not so debilitating an effect as bleeding, they are seldom omitted, even when the evacuation of blood is judged dispensable. Natron vitriolatum,* magnesia vitriolata,† & soda phosphorata, are the most proper. It sometimes happens, that the stomach and bowels of patients, who are affected with inflammations, are not in a healthy state, and all the abdominal secretions are carried on in a sluggish, and imperfect manner. In such instances, purgatives, and even emetics, must operate with peculiar benefit.

As drastic purgatives generally occasion considerable irritation in the system, they should not be prescribed in ordinary cases of inflammation. The surgeon, on the contrary, should prefer the mildest of the neutral salts, as already specified; and, in some instances, prunes, manna, or tamarinds, will keep the bowels sufficiently loose, without the use of other medicines. Laxative clysters, which are both safe and efficacious, in a great number of cases, are not to be forgotten. When mild purgatives alone fail in overcoming costiveness, and procuring stools, they will frequently succeed, if assisted by clysters.

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* Sodæ Sulphas. † Magnesiæ Sulphas, L. P.

ANTIMONIALS.

The employment of nauseating doses of antim. tartarizatum proves advantageous in two ways: it relieves that oppressive dryness of the skin, which accompanies the fever attendant on severe local inflammation; it diminishes the increased action of the vessels of the inflamed part. Whenever nausea is produced, the whole constitution sympathizes with the stomach so intimately, that it is immediately thrown into a temporary state of debility, every considerable operation in the machine becoming lowered, and among others, the process of inflammation. When there is particularly urgent reason for putting a sudden check to inflammation, the use of antimonials ought never to be neglected. Inflammation of the brain, arising in consequence of external violence, is a case affording an illustration of the last observation.

OPIUM.

The practitioners of this country, considering opium as a strong stimulant, seldom employ it in cases of phlegmonous inflammation, except when the severity of the pain is excessive. I think, that when the patient's sufferings are particularly great, the majority of experienced men will contend, that the use of opium is, on the whole, a very judicious practice. Among the celebrated continental surgeons, Richter is a strong advocate for the use of opium, in cases of inflammation, advising the medicine to be exhibited after evacuations have been made. There can be little doubt, that the continuance of violent pain, and the total loss of rest, must have a bad effect on the local affection, the progress of which must always be greatly influenced by the state of the constitution. If the exhibition of a liberal dose of opium will procure sleep, and calm the constitutional disturbance attendant on violent inflammations, even were such practice to be productive of no good effects on the local complaint, still it seems entitled to praise, because the patient's sufferings are, at all events, diminished, while the inflammation is not increased. Richter, however, has very judiciously represented the necessity of exhibiting a large dose. Small quantities of opium always rather augment, than lessen, the restlessness, and other febrile symptoms, which occur in cases of inflammation. After the performance of any grand operation, the surgeon should either give a liberal dose of opium, or else none at all.

DIET AND REGIMEN.

The patient should invariably abstain from fermented and spirituous liquors, and when the inflammation is extensive, or vehement, he should also dispense with solid animal food. Light broths, and vegetable food, are the most proper. Diluent and acidulated beverages may be taken with freedom, such as lemonade, capillaire and water, barley water, &c. The patient should be kept as quiet as possible, away from any noise, or objects, which might agitate or disturb him. His chamber should not be too warm, nor ought he to be covered with too much clothing; for, whatever tends to heat him, and hurry his circulation, cannot but be detrimental. Nothing is more certain, than that inattention to diet, and the antiphlogistic regimen, often frustrates the wisest and most judicious treatment.

COLD APPLICATIONS.

Heat naturally promotes all animal actions, and in this view, it cannot fail to act injuriously on inflammation. Hence, arises the indication to diminish the heat of the part affected by making use of cold topical applications, and maintaining a continual evaporation from the inflamed surface.

The lotions, employed for this purpose, are commonly of an astringent and sedative nature. As the acetite of lead possesses both these qualities, a solution of it is most frequently used. A solution of ʒss. of this salt in ℥iv. of vinegar, and ℔ij. of distilled water, is a very good application. When the aq. litharg. acet.* is employed, ʒj. to a pint of water is the due proportion.

Such surgeons as are fearful of the deleterious effects, which have been known to arise from the absorption of lead, make use of a solution of ʒj. of zincum vitriolatum† in ℔j of water. Linen, kept constantly wet with these lotions, is to be applied to the part affected.

Astringent and sedative lotions are the most proper in the majority of phlegmonous inflammations. It may be questioned, whether the lead usually contained in them has the power of acting on the vascular structure of the part affected? for, unless we admit this, it becomes exceedingly difficult to explain, how it is beneficial in subduing inflammations. If we could rationally make out that astringents have the power of producing a diminution of the dilated arteries, with which they are not actually in contact, we should then be able to account for their efficacy. Also, were it in our power to prove, what appears highly probable, that the vessels, beneath the surface of the body, sympathize with that surface, in which astringents do evidently produce corrugation, we might then satisfactorily explain their *modus operandi* in cases of phlegmon. At present, I believe we must rest contented with what is apparently a fact, that astringent sedative applications made to the surface of the body, do operate on the process of inflammation beneath.

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* Liquor Plumbi Acetatis, L. P.

† Zinci Sulphas, L. P.

What renders it still more probable, that astringents and sedatives affect the vascular action in inflammation, is the power, which many external applications have of exciting the action of the absorbents. I have mentioned, that, in inflammation, there is an impediment to absorption. How useful, therefore, must the employment of external discutient applications prove in cases, in which the extravasation of blood and lymph into the interstices of the inflamed part, is exceedingly copious. Hence, lotions containing sal ammoniac,* are generally more efficacious, in inflammations arising from contusions, concussions, and sprains, than astringents and emollients. In such cases, when the inflammation is slight, and the swelling and extravasation considerable, even embrocations and liniments are preferable to any kind of lotion.

One of the best discutient lotions is what is employed at St. Bartholomew's hospital: ℞ ammon. muriatæ ʒss. aceti et spirit. vin. rectif. sing. ℔j. M. Another very good one is composed of aq. ammon. acet. alone, or mixed with equal parts of spirit of wine, and distilled water.

WARM APPLICATIONS.

It is a curious fact, that inflammations are sometimes benefited by cold local applications, and sometimes by warm emollient poultices and fomentations. As practice sufficiently confirms the truth of the observation, and theory might lead us into hypothesis, I conceive it will be no loss to the reader to omit all speculations on the subject. Although, in the generality of cases, cold astringent lotions are preferable to warm applications, yet, it sometimes happens, that they do not have their usual good effect, either from the singularity of the patient's constitution, or from the structure and situation of the inflamed part. The swelled testicle and the incipient stage of acute opthalmy receive more benefit from emollient fomentations and poultices, than from astringents. Inflammations, not admitting of a cure without suppuration, must be treated with emollients; for, the sooner the matter is formed, the sooner the inflammation ends. The inflammation attending contused wounds, and the boil, is of this sort. That originating in fevers generally proceeds to suppuration, and ought to be treated on the emollient plan.

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* Ammoniæ Murias, L. P.

The best emollient poultice is that made of linseed meal. It is made by gradually mixing the powder with hot water, until the consistence is such as it ought to be. A little oil is often added, which prevents the application from drying and becoming hard.

A very good emollient fomentation is that used at St. Bartholomew's hospital: ℞ lini contusi ʒj. chamœmeli ℥ij. aquæ distil. ℔vj. paulisper coque et cola. When the pain is exceedingly severe, the following fomentation, in use at Guy's hospital, often produces great relief: ℞ papaveris albi exsiccati ℥iv. aquæ puræ ℔vj. coque usque remaneant ℔ij. et cola.

TERMINATIONS OF INFLAMMATION.

Inflammation has three different terminations; or, to speak more correctly, after this process has continued a certain time, it either subsides entirely, induces a disposition in the vessels to form pus, or completely destroys the vitality of the part.

Ulceration is also an effect sometimes directly produced by phlegmonous inflammation; but it more frequently does not commence till suppuration has rendered it necessary.

FIRST.—RESOLUTION.

The most common way, in which inflammation ends, consists in a gradual abatement of the pain, redness, swelling, throbbing, and heat of the part, without any formation of matter, or permanent injury of structure. This is termed *resolution*, and is the best manner in which inflammation can possibly end.

SECOND.—SUPPURATION.

The next most frequent termination of phlegmon is in the production of pus, termed *suppuration;* a state, in which there is rather a modification of the increased action, than a cessation of it.

THIRD.—MORTIFICATION.

The other manner, in which inflammation ends, is in the death of the part affected. This is the worst, but, happily, the least frequent result of common inflammation.

Every part, just recovered from the violence of phlegmonous and other kinds of inflammation, may be regarded as still imperfect. Its vessels seem to have become weak in proportion as they have been previously excited to extraordinary action, and every part affected with vascular weakness has a great tendency to fresh inflammation. Sometimes, in consequence of the loss of tone, induced in the vessels by the vehemence of acute inflammation, a languid or chronic inflammation succeeds, which it is very difficult to overcome. Hence, however improper stimulants, astringents, and corroborants may be, as local applications, during the violence of phlegmonous inflammation in many situations, they are generally highly proper the moment that stage ceases. Thus emollients, which, for the first few days, are serviceable in acute ophthalmy, act afterwards prejudicially, in consequence of their relaxing nature.

CHAP. II.

OF THE SYMPATHETIC, SYMPTOMATIC, OR INFLAMMATORY FEVER.

AFTER being informed, that the mass of circulating blood becomes affected in cases of inflammation, we must expect to find traces of constitutional as well as of local disturbance. In fact, we have already repeatedly mentioned the fever attendant on inflammation, and some particular account of it is now proper.

Its name is derived from its being, as it were, one of the symptoms of the local disorder, and the sympathy of the whole constitution for the disturbed state of a part.

SYMPTOMS AND VARIETIES.

The symptoms are: a frequent, strong, and full pulse; diminution of the secretions; a hot dry state of the skin; scanty high-coloured urine; dry furred tongue; thirst; disturbance of the nervous system; loss of appetite and sleep; in some cases delirium.

The febrile symptoms appear in this form, when any considerable phlegmonous inflammation affects common parts, and the integuments in any situation in the body; the disturbance of the system being, in a great measure, proportioned to the extent and violence of the local affection.

The effects of inflammation on the constitution, however, are not simply proportioned to the quantity of inflammation; they are influenced as much by the nature of the parts, in which it is situated, as by its extent.

When muscles, cellular membrane, skin, &c. are inflamed, the pulse is, as we have described, strong and full. These may be said to be common structures.

If the inflammation is in tendinous, ligamentous, or bony parts, the stomach sympathizes more, than when muscles, &c. are inflamed. The pulse is quicker, but has not so much fulness, and the blood, not being propelled so far into the small vessels, forsakes the skin.

When inflammation is in vital parts, or such as sympathize with the stomach, there is great depression blended with the constitutional symptoms, the pulse is frequent and small, and the blood is not pushed into the minute vessels. A very remarkable depression of strength very frequently attends an inflammation of the intestines, and the pulse is small and hard; whereas, when the surface of the body is the seat of the affection, there is often a temporary augmentation of tone, with a full, strong, and hard pulse. In fact, when the peritoneum and intestines are inflamed, the patient frequently seems so reduced, and his pulse so small, that the surgeon is afraid to use the lancet. Perhaps, however, he at length ventures to do so; the blood appears exceedingly sizy, and the pulse gains strength, in proportion as the disease yields to, and is benefited by, the evacuation.

It is rather a curious fact, remarked by Mr. Hunter, that all inflammations of parts, which derive their nerves from the great sympathetic nerve, occasion an unusual lowness of spirits.

When the constitution is good, and parts not very essential to life are inflamed, the pulse becomes increased in strength and fulness. When the same parts are affected in weak irritable persons, and in women who lead sedentary lives, the pulse is quick, hard, and small, at the commencement of the inflammation, just as if vital parts were concerned.

Thus we see, that all the varieties of inflammatory fever depend chiefly on four circumstances; viz. the extent of the inflammation; the structure of the parts affected; their functions; and the nature of the constitution.

TREATMENT OF THE SYMPATHETIC INFLAMMATORY FEVER.

As the cause of the sympathetic inflammatory fever is the local inflammation, it is obvious, that while we are endeavouring to cure the latter, we are taking the most effectual steps for the relief of the constitutional disorder.

But, as excessive febrile disturbance may, in its turn, have a bad effect on the local complaint, it is sometimes proper to endeavour to palliate the constitutional symptoms by having recourse to such means, as might not be necessary, were the inflammation not aggravated by the fever.

The frequency, strength, and fulness of the pulse, may be diminished by the use of the lancet, the exhibition of saline purgatives, and of such medicines as nitre and sal ammoniac. Bleeding, however, is hardly ever necessary on account of the fever itself; consequently, it is never practised with a view of altering the state of the pulse, except in cases, in which the local inflammation is important on account of its extent or situation; and when the increased action of the whole sanguiferous system might seriously exasperate the local mischief. Here, also, we should probably use the lancet, on account of the inflammation, were it possible to have, at the same time, a fever, ever so inconsiderable.

In short, if the inflammation should not require bleeding, it can never be requisite for the fever, which invariably subsides with the local disturbance.

The diminished secretions are to be promoted, and a gentle diaphoresis ought, in particular, to be excited. Antimony is the best medicine for this purpose. When this mineral will not remain in the stomach, the aqua ammon. acet. is an excellent substitute.

CHAP. III.

SUPPURATION.

WHEN, notwithstanding the foregoing treatment, the inflammation becomes attended with more severe pain, a much harder tumefaction, and a conical prominence in its centre, suppuration is likely to ensue.

Sometimes this event may, from the first be prognosticated; for some inflammations, from their peculiar nature, necessarily terminate in suppuration. The boil is generally considered as an instance of this kind. Some authors also mention particular inflammations, which have been termed *critical*, as being of the same nature.

SYMPTOMS.

When the patient is seized with reiterated shiverings; when the fever, and all the symptoms of inflammation, suddenly cease, without any perceptible reason; when the patient experiences a heavy, cold, dull uneasiness, instead of acute pain, in the part affected; when the most elevated part of the tumor appears soft, and white, while the rest has its redness increased; and when, at the same time, the surgeon can feel the fluctuation of a fluid, matter is undoubtedly already formed.

The latter symptoms only occur, when the matter is superficially situated. In other cases, the quick subsidence of all the inflammatory symptoms, the repeated rigors, and the sense of weight and coldness, only afford grounds for suspecting that matter is formed. This suspicion, however, is afterwards strengthened by the patient having nocturnal sweats, with emaciation, and other hectic symptoms. Also, an oedematous swelling, at first not very extensive, takes place over the situation of the abscess, and afterwards expands so as to extend over a whole member. These circumstances leave no doubt of there being a hidden collection of matter. A man, endued with great nicety of touch, can often feel the undulations of matter, even when deeply lodged.

THEORY OF SUPPURATION.

The exposure of the internal surfaces and structure of the body, continued for a certain time, necessarily occasions suppuration. Here the influence of the air is not the cause; for, were a wound to be made into a cavity naturally closed, pus would be formed, after a certain time, even in a vacuum. When matter forms in circumscribed cavities without a wound, the air cannot be suspected as a cause: nor does the air, in emphysematous cases, excite suppuration.

The sympathetic fever, attendant on inflammation, has been considered an essential step to suppuration; but with little foundation. Is there not a regular secretion of pus from the most indolent ulcers? Is there not the same process on every blistered surface? In such cases, is there not oftentimes a total absence of fever.

That dead animal matter cannot be converted into pus, is proved by sloughs of the cellular membrane, tendons, fasciæ, &c. &c. remaining unchanged in abscesses a considerable time, and by dead bone lying unaltered in pus for many months. Whatever diminution of these substances may, under such circumstances, happen, occurs only on that side, which is next to the living solids, and it can be satisfactorily accounted for on the principle of absorption.

The idea, that fermentation contributes to the formation of pus, is quite destitute of foundation. The discharge of pus from secreting surfaces, without any loss of substance; the stationary state of many abscesses; the backwardness of matter to become putrid, while unexposed to the air; sufficiently evince, that no fermenting power is present.

The opinion, that extravasated blood can in time become converted into pus, is equally erroneous.

When suppuration is about to take place in the cellular substance, or membranes of circumscribed cavities, the vessels alter their mode of action, so as to secrete pus. This change happens gradually. Hence, pus and coagulating lymph are often found blended together in the same abscess.

The fact, that pus may be formed without a breach of the solids, or dissolution of parts, was first noticed by Dr. Hunter, in 1749, or 50, in the dissection of a subject who died of empyema. M. Quesnay has inserted, in the memoirs of the French Academy of Surgery,* a case which fell under the observation of M. Peyronie, in which a very copious suppuration of the brain took place. The patient died, and the head was examined. The proportion of brain wanting was so trivial, compared with the quantity of pus, which had been produced, that Peyronie justly concluded, that the matter had not been formed from the solids, but from the fluids of the part.

Dr. Swediaur, in his treatise on venereal complaints, p. 296, edit. 3, censures Mr. Hunter for having imputed the discovery of the fact, which we have just noticed, to Mr. Sharp, and Dr. W. Hunter; and, he states, that the circumstance was ascertained, several years before 1749, both by Morgagni in Italy, and De Haen at Vienna. Dr. Swediaur, however, has omitted to cite any particular passages from the works of the latter celebrated writers, in confirmation of their prior claim; an essential thing to be done, if this gentleman is desirous of conferring the honour on their memories, after taking it from others.

The modern doctrine of suppuration is, that the pus is separated from the blood by the inexplicable operation of the secerning arteries, just as ordinary secretion takes place; and that the peculiar mode of action in the arteries, is the reason, why pus should be separated from the circulation, rather than coagulating lymph, mucus, &c. &c. It is further believed, that the solids never suffer any dissolution, so as to enter into the composition of pus; and that the deficiency, frequently apparent in them, arises from absorption. The arteries, in producing pus, a fluid so dissimilar from blood, and of which, at least, it must be considered as a new combination, seem to assume all the power of glandular secretion.

QUALITIES OF PUS.

Pus consists of globules swimming in a transparent, colourless fluid, which differs from every other animal secretion, in being coagulable by the muriate of ammonia. The colour, which is ordinarily a light yellow, is imparted by the globules. From the appearance, which these assume, when examined in the microscope, they are probably white; at least, they appear to have some degree of opacity The specific gravity of pus is greater than that of water. It does not mix with water in the heat of the atmosphere, but falls to the bottom. If kept, however, in a considerable degree of heat, it rises, and diffuses itself through the water, and remains mixed with it, even after becoming cool, the globules being decomposed.

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* See Remarques sur les Plaies du Cerveau, in Tom. 2, p. 163, Edit. 12mo.

The fluid part of pus resembles serum, and, like it, is coagulable by heat; but it cannot, like milk, be coagulated by the gastric juice of animals. Healthy pus has little smell, is void of acrimony, and is of the consistence of cream, its globules are abundant, and of a lightish colour. When pure, it does not readily putrify; but this quality is lost, when there are extraneous additions blended with the matter. In specific diseases, cases of caries, &c. the matter is often mixed with blood, coagulating lymph, &c. and then it has more tendency to putrify and become offensive. Pus always partakes of the nature of the sore which produces it. To the surface secreting it, pus is quite unirritating, though it may greatly irritate any other. Hence, it is useless to wipe matter so completely from the surface of granulations, as some are wont to do; but it is highly proper to keep the surrounding skin free from it.

When any disease attacks the suppurating surface, or the constitution, the pus becomes thinner, more transparent, more disposed to putrify and become fetid. *Sanies* is the term frequently given to pus in this degenerated state. Sanies may be very irritating to parts, so as to cause their absorption; but it never has the power of corroding them.

The changes in the appearance of pus arise more from the indolence, and irritability, of the parts producing the matter, than from disease. Many specific diseases, in healthy constitutions, produce no alteration in the appearance of the matter. Thus the matter of gonorrhœa, the small pox pustules, the chicken pock, and that of a healthy sore, seem to be made up of similar parts, consisting of globules floating in a transparent fluid, like common pus, the specific properties of each of these poisons being superadded to those of pus. Mr. Home observes, however, that the matter of cancer may form an exception to the preceding remark, although it should also be remembered, that a cancerous sore is never in a healthy state.

Flaky particles are generally blended with the pus, which is formed from indolent ulcers, and in scrofulous abscesses.

The discharge from irritable ulcers is often thin, being chiefly composed of an irritating aqueous fluid, mixed with blood. Good pus is most readily produced in situations, near the source of the circulation.

DIFFERENCES BETWEEN PUS AND MUCUS.

Secretions of another kind, sometimes, have a resemblance to pus. The following circumstances form a line of distinction. Pus sinks in water; mucus floats. Pus communicates to water an uniformly troubled white colour; mucus gives the appearance of stringy portions floating in it. Mucus is more readily dissolved by sulphuric acid, than pus. If water be added to such solutions, the pus is precipitated to the bottom; while the mucus, instead of being completely precipitated, forms swimming flakes. A solution of caustic alkali dissolves both pus and mucus; but, when water is added, the pus becomes separated, but not the mucus.

CYSTS OF ABSCESSES.

If there were not some boundary to an abscess, some partition between the pus and the cavities of the cellular substance, the matter would diffuse itself extensively on all sides, like the air in emphysema, or the water in œdema. To prevent this circumstance, we find, that coagulating lymph is deposited immediately around the collection of matter; and, becoming organized, assumes the appearance of a membranous cyst. In abscesses of long standing, the cysts are often of very considerable thickness, while in other collections of matter, that have been sudden in their formation, and have not existed long, the surrounding lymph has scarcely had time to be converted into a vascular membranous cyst. The cysts of all abscesses are both secreting, and absorbing surfaces. When the pus has been completely discharged by a puncture, the cavity soon becomes filled with pus again. Very large and palpable collections of matter are often observed to disappear entirely, and in a manner only to be explained by the action of the absorbents.

Matter always tends to the surface of the body, making its way through a considerable thickness of parts, in order to arrive there. Even when there is but a delicate membrane between the matter and some internal cavity of the body, the abscess generally bursts externally, though it may have to make its way through a remarkable thickness of substance. Its progress is always aided by the relaxation of the skin situated immediately over the abscess. The skin, in this situation, is always looser than when it yields to mere mechanical distention, unless the increase of the abscess be very rapid.

As the matter advances towards the surface of the body, the intervening substance is absorbed.

TREATMENT OF PHLEGMONOUS ABSCESSES.

The generality of phlegmonous abscesses soon burst, and seldom require being opened. When punctured unnecessarily, or prematurely, they never heal so favourably, as when left to themselves.

Particular cases, however, should be opened, as soon as the existence of matter is ascertained. When suppuration takes place beneath fasciæ, which invariably retard the progress of the matter to the surface of the body, an early opening should be made. When this is not done, the matter spreads to a great extent, separating such ligamentous expansions from the muscles, and the muscles from each other. Also, when the matter is so situated as to be liable to insinuate itself into the chest, or abdomen, or into the capsular ligaments of joints, it is highly proper to prevent this extension of mischief, by making a timely opening into the abscess.

DIFFERENT MANNERS OF OPENING ABSCESSES; ADVANTAGES OF DOING THIS OPERATION WITH A CUTTING INSTRUMENT.

Authors mention three principal ways of opening abscesses: 1. by a lancet;—2. by caustic;—3. by a seton. In almost all cases, the lancet is preferable to caustic. It opens the abscess quickly, and with less pain; it occasions no loss of substance, consequently a smaller cicatrix; and, by its employment, the opening may be made in the most advantageous direction, and of the exact size necessary.

The place, where the puncture generally ought to be made, is, where the fluctuation is most perceptible, or where the conical eminence, or, as it is termed, the *pointing* appears; for, in this situation, the integuments are thinner than elsewhere.

It is also proper to make the opening in a depending situation, if practicable, in order to allow the matter to escape as soon as it is formed. Collections of matter, beneath the fasciæ of the forearm and thigh, particularly demand attention to this direction, as they commonly point, where those ligamentous bands are naturally thinnest, not where the matter can most readily escape.

A grand object, in the treatment of most abscesses after they have burst, or been opened, is to maintain such an opening, as will prevent any future lodgment of a large quantity of pus. When this indication is fulfilled, the cavity of the abscess soon contracts, and becomes filled up with granulations.

When an abscess bursts spontaneously, the opening is not likely to heal, as long as it communicates with a cavity into which pus is secreted; and, consequently, there is no occasion to take any measures to prevent its closing. But, when a collection of matter is deeply situated, and has been opened by an incision, the wound is very likely to close again, especially, if not in a depending situation. In this case, the surgeon must take care to insinuate a piece of lint between the edges of the puncture, and he ought, at every visit, to introduce a probe through its track.

Very large collections of matter generally require a small opening. When extensively opened, violent inflammation invades the cyst, and the constitution is thrown into the most severe, and often fatal derangement. This subject will be better understood, when the lumbar abscess has been considered.

Some abscesses do not heal, though the matter may easily find its way out; for, their internal surfaces will not form granulations, unless a complete denudation of them be made, and fresh inflammation be excited. Abscesses about the anus, axillæ, groins, scrotum, and labia pudendorum, are of this kind. It is true, however, that such cases are often prevented from getting well by the cavity of the abscess not having a very direct external communication.

The curved bistoury, and director, are the instruments generally used for enlarging the opening of an abscess.

OF OPENING ABSCESSES WITH CAUSTIC.

The calx viva cum kali puro* or the kali purum alone, is the best caustic for opening abscesses. The part is first to be covered with a piece of adhesive plaster, which has a portion cut out of the figure and size of the opening intended to be made in the abscess. The best way of making the eschar is to dip the end of the caustic in water, and to rub it on the part till the skin becomes brown. The active substance is then to be immediately washed off with some wet tow, the plaster is to be removed, and an emollient poultice applied.

This method of opening abscesses is very seldom warrantable. If it is advantageous in any case, it is when there is a small collection of matter surrounded by a good deal of indolent hardness. It is much against the practice, that it is impossible to prescribe any precise boundary to the action of the caustic, and that, unless the eschar is made to a sufficient depth, the lancet must after all be used. Caustic also leaves behind a disagreeable scar, a consideration of material importance, in abscesses about the necks and faces of females. Sometimes, ten or twelve tedious days elapse, before the detachment of the eschar is completed.

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* Potassa cum calce. L. P.

OF OPENING ABSCESSES WITH A SETON.

The making of considerable openings, into many large abscesses, has certainly been a very frequent cause of a violent inflammatory affection of the whole inner surfaces of such collections of matter, of high constitutional derangement, and of death. The free access of the air into the cavity of the abscess has been set down as the cause of such ill consequences, though, perhaps, without sufficient foundation. The want of discrimination, in this part of surgery, has brought the best means of opening of abscesses, namely, a cutting instrument, into almost indelible disgrace. It is to be remarked, however, that the abscesses, which have caused such an alarming train of consequences, by being extensively opened, are not acute phlegmonous ones, but large chronic collections, for the most part situated in the loins. (See Chapter on the Psoas Abscess.) It is indisputably true, that numerous lives have been sacrificed to the reproachable plan of making a large opening into these abscesses, which frequently contain nearly a gallon of matter, and of course must have cysts of immense extent. The irritation, and inflammation, of such a surface, must be a perilous circumstance.

It is entirely on account of the terrible consequences, which have repeatedly resulted from opening these large chronic abscesses with a knife, that the employment of a seton has been so much extolled in modern times, as the best means of discharging, in a gradual manner, the contents of abscesses.

If we consult almost any system of surgery, and reflect on the nature of phlegmonous abscesses in general, we shall soon perceive, that the writers have not recollected, that the pus, in such cases, for the most part tends quickly to the surface, and, if not evacuated by an incision, soon makes its own way outward. In this circumstance, the quantity of matter is hardly ever so great as in lumbar abscesses, where a free incision is notoriously dangerous in the extreme. Even, when a phlegmonous abscess is large, the opening of it never occasions the disturbed state of the system, which often ends in death, when extensive chronic abscesses are opened. The inside of a chronic abscess may be considered as a diseased surface; the inside of a phlegmonous one, cannot be set down as in a morbid state. The first, though diseased, is not in an active state of inflammation; the latter, though free from disease, is yet acutely inflamed. The parts, surrounding a phlegmonous abscess, are generally in a high state of inflammation, even before the collection of matter bursts, or is opened, and, still the terrible constitutional disorder, frequently following the opening of large chronic abscesses, does not exist. These observations are quite sufficient to convince every impartial man, that it is the irritation of the diseased extensive surfaces of chronic abscesses, which is the circumstance to be greatly dreaded; and that these cases have been most strangely confounded with acute phlegmonous abscesses, to which a seton is never advantageous.

TOPICAL APPLICATIONS TO PHLEGMONOUS ABSCESSES.

The best applications to phlegmonous abscesses are fomentations and poultices. While the skin covering the collection of matter continues entire, they are the best dressings, because they favour the relaxation of the skin, and accelerate the progress of the matter to the surface of the body. When the abscess has been opened, or has spontaneously burst, they are the most proper applications; for they promote the continuance of suppuration, without which, granulations cannot be produced to fill up the cavity. As soon as the cavity is nearly filled up, the more simple and superficial the dressings are, the better.

After inflammation has arrived at a certain pitch, cold applications and continued evaporation from the part affected avail nothing; on the contrary, they seem to augment the pain, and they probably do so by preventing the relaxing process of the skin. All the changes of phlegmonous inflammation are quick; if it is to terminate in resolution, it will generally do so in about a week or ten days: if it continues unabated beyond this period, suppuration may be expected, and perseverance in the use of cold astringent lotions only prolongs the disorder, by retarding what cannot be avoided.

When the abscess has completely formed; when it has been opened, or has burst, so as to emit daily a considerable discharge; and when the violence of the surrounding inflammation is abated, the patient must be allowed a more generous diet. Animal food, wine, and fermented liquors, may now be given with advantage. When the discharge is so copious as to induce debility, attended with loss of appetite, bark is to be administered. Opium may also now be given, either with a view of relieving the aggravated pain that immediately precedes the formation of matter, or of procuring sleep.

CHAP. IV.

HECTIC FEVER.

ITS NATURE AND SYMPTOMS.

THE irritation of a local injury upon a healthy constitution produces that disordered state of the system, termed the *symptomatic* or *sympathetic* fever. This is the *immediate* consequence of local irritation.

The system, fatigued and debilitated by the continuance of a disease, which it cannot subdue, at length loses the power of entering into those strong actions, which accompany the inflammatory fever. However, exhausted as it becomes, it still sympathizes with the local irritation. The *hectic* fever, contrasted with the sympathetic inflammatory one, is to be regarded as the *remote* consequence of local injury or disease.

The symptoms are: a frequent, small pulse; moist skin; pale, copious urine, with sediment; debility; the tongue is generally moist; the appetite fails; all aliment is frequently rejected from the stomach; there is a great readiness to be thrown into sweats: and at night the patient perspires in bed; he has frequently a constitutional purging, and is occasionally troubled with chills and flushes of heat. The nervous system is deranged; and loss of sleep; indigestion; flatulence, &c. occur.

Hunter has distinguished the hectic fever into that which arises from the absolute incurability of the local complaint, and into another species, which depends on a disease that is curable, if the patient's constitution had powers sufficient.

TREATMENT OF HECTIC FEVER.

The exciting cause of every disease must be removed, ere much alleviation can be expected. If copious and long-continued suppuration give rise to that affection of the constitution, denominated hectic fever, how can the febrile disturbance cease as long as the discharge of matter continues? If the irritation of a scrofulous joint excite hectic fever, we should in vain expect to calm the constitutional disorder, unless the local cause be first diminished.

When the local complaint, connected with the fever, is totally incurable, it must, if possible, be removed by a manual operation. But when the local disease presents the prospect of being cured, provided the state of the constitution were improved, the surgeon, in this case, is to endeavour to strengthen the patient. Frequently, the nicest judgment and discretion are requisite to determine, how long it is safe to oppose the power of medical surgery to the influence of an obstinate local disease on the constitution. For, although patients, in an abject state of weakness, arising from irremediable local disease, have oftentimes been restored to health by a removal of the morbid part, yet many have been suffered to sink so low, that no future treatment could relieve them. Clemency in the practice of surgery does not consist so much in withholding strong and vigorous measures, as in deciding to practise them the first moment they are indicated.

When an incurable disease in an extremity is removed by amputation, the hectic fever immediately begins to abate. "I have known," says John Hunter, "a hectic pulse at 120 sink to 90 in a few hours, upon the removal of the hectic cause; I have known persons sleep soundly the first night, without an opiate, who had not slept tolerably for weeks before; I have known cold sweats stop immediately, as well as those called colliquative; I have known a purging stop immediately upon the removal of the hectic cause, and the urine drop its sediment."

I am afraid no medicine has the direct power of communicating strength to the human constitution. To combat particular symptoms, and to promote digestion, is all that can be done, as long as efforts are made to cure the local disease, without removing it by an operation.

Bark proves a serviceable medicine, in cases of hectic fever, by increasing the appetite, and tone of the digestive organs. The infusion is less likely, than the decoction, to disagree with the stomach. Nourishing food, easy of digestion, should be taken frequently, and in moderate quantities at a time. In these cases, gentle cordial, and aromatic draughts, often prove exceedingly useful.

Here opium is also a valuable medicine, not only procuring sleep, and alleviating pain, but acting as one of the best remedies for checking the diarrhœa frequently present.

CHAP. V.

MORTIFICATION.

WE have considered inflammation as depending in a great measure upon an increased action of the arteries concerned. If the part has sufficient powers to undergo the preternatural excitement, resolution, or suppuration, is the result. But, when the vehemence of the action is altogether disproportioned to the vital power of the inflamed part, or when its duration has exhausted this power so much, that the vessels can no longer act at all, mortification necessarily takes place. Sometimes, in this circumstance, the activity of the absorbents supersedes the necessity for mortification, by removing parts back into the system, and occasioning, what is termed, ulceration.

Of all the kinds of inflammation, that, which will be hereafter treated of, under the name of erysipelas, most frequently produces mortification.

SYMPTOMS.—TWO STAGES OF MORTIFICATION, &c.

The symptoms of an incipient mortification are: First, a sudden diminution of the pain and sympathetic fever; Secondly; a livid discoloration of the part, which, from being yellowish, becomes of a greenish hue; Thirdly; a detachment of the cuticle, under which a turbid fluid is effused; Fourthly; the swelling, tension, and hardness subside, and, on touching the part, a crepitus is perceptible, owing to the generation of air in the cellular substance.

While the disease is in this stage, it is termed *gangrene*.

When the part has become quite black and fibrous, and destitute of motion, sensation, and natural heat, the disease is then denominated *sphacelus*.

An unpleasant hiccough commonly attends the occurrence of gangrene and sphacelus. Every man of experience has a well-founded dread of this symptom, in cases of strangulated hernia; for, it is almost a sure indicator of grangrenous mischief within the hernial sac.

In the large vessels leading to a mortified part, the blood usually coagulates for some distance from the slough, and this is the reason, why the separation of a mortified limb is seldom followed by hemorrhage.

When any part of the body mortifies, the constitution suffers immediately a considerable dejection. The patient's countenance suddenly assumes a wild cadaverous look; hiccough takes place; the pulse becomes small, rapid, and sometimes irregular; and cold perspirations, diarrhœa, and delirium frequently occur. I need scarcely add, that, under such symptoms, many cases have a fatal termination.

MORTIFICATION UNPRECEDED BY INFLAMMATION.

Mortification often takes place unpreceded by inflammation.

Impediment to the return of blood through the veins sometimes produces grangrene and sphacelus. In this case, the blood-vessels become turgid, and the part swells, and becomes livid and very painful. Vesicles soon arise, and, at length, the part becomes soft, œdematous, emphysematous, cold, black, insensible, and fetid. A strangulated hernia affords an instance of such mortification.

Impediment to the flow of arterial blood into a part is another cause of mortification. This case is at first attended with softness and coldness of the part, which loses its natural size, and becomes void of sensibility, shrivelled, black, and lifeless.

Great general debility, extreme old age, and an ossified state of the arteries, frequently produce a species of mortification, different from that following inflammation.

Pressure on any part of the body often gives rise to morification, especially, when the constitution is weak, and the circulation languid, in consequence of sickness, and long confinement in bed. This frequently occurs in cases like fractures, where the patient is necessitated to remain a long time in the same posture. It attacks parts where the bones are covered with little flesh, and, consequently, where the external pressure has most effect. Sloughs, produced in this way, frequently occur over the trochanter major, os sacrum, os ilium, scapulæ, &c. The part affected becomes soft, lead-coloured, red at the circumference, œdematous, and, at last, black and senseless.*

Exposure to cold likewise often occasions a sort of mortification, different from that which ordinarily arises from inflammation.

But, the attention of the reader is particularly requested to a peculiar sort of mortification, beginning at the extremity of one, or more of the small toes, and passing on to the foot and ankle, and sometimes, to a part of the leg, quite unpreceded by any appearance of inflammation.

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* See Richter's Anfangsgrunde der Wundarzneykunst, Band 1, Kap. 4.

In some few instances, it makes its appearance with little or no pain; but, commonly, the patient feels great uneasiness through the whole foot and ankle-joint, particularly in the night time, even before the parts shew any marks of distemper, or while there is only a small discoloured spot on the end of one of the little toes. From this spot the cuticle is always detached, and the skin underneath is of a dark red colour. Sometimes it is slow in spreading from toe to toe. At other times, its progress is rapid, and horridly painful. It is most frequent in males, and is more often met with in the rich and voluptuous, than in the labouring poor. It frequently happens to persons advanced in life; but it is by no means peculiar to old age. It is said to happen often in persons subject to gouty pains in the feet, without having regular paroxyms of the disorder. Few mortifications proceed so slowly as that now described; it spreads, however, more quickly when it invades fleshy parts.*

Among the common causes of mortification, we have also to rank violent inflammations of every sort, but more especially erysipelas; severe burns; bad compound fractures and dislocations; extensive contused and lacerated wounds; chancres in particular constitutions; violent bruises; various surgical operations; many kinds of fevers; gunshot injuries; extravasation of urine in the scrotum; irritable ulcers; carbuncles; &c.

Certain states of the constitution evidently appear to promote the occurrence of mortification. A disposition to the disorder may be either constitutional, or accidental. We may conclude, that the malady depends upon some particularity of constitution, when we observe mortification rapidly follow symptoms, which were apparently very inconsiderable, and from which, in common instances, no such mischief would have arisen. It is a disposition of this kind, which, perhaps, renders the small-pox so dreadful a disease to some individuals, while it afflicts others with comparative mildness. It is the same disposition, which, in all probability, makes wounds, occurring in some particular families, always highly dangerous, though similar injuries in the generality of people would be attended with no such peril.

Numerous causes may produce an accidental disposition to mortification; as, for instance, old age, debilitating diseases, mode of living, climate, and residing in particular unhealthy places. In the plague, typhus fever, and that peculiar state of the system, which usually attends the formation of carbuncles, there is manifestly a great tendency to grangrene. In dropsical subjects, the disposition to mortification is known to every body.

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* See Pott's Chirurgical Works, Vol. 3.

That old age and debilitating diseases render the access of gangrene more likely to happen, is a fact requiring no comment.

The mode of living has also immense influence, as is proved by the greater frequency, with which all inflammations and wounds mortify in persons, who lead drunken and intemperate lives. The tendency to mortification induced by living on vitiated rye is very remarkable. We have on record a deplorable example of the effects of such diet, where a woman and her six children were dreadfully attacked with a sphacelus of their lower extremities.*

No one can doubt the influence of climate in bringing on gangrene. Every naval and military surgeon will attest, how much more readily and frequently mortification occurs in hot countries, than cold ones.

It is equally undeniable, that a disposition to gangrene and sphacelus seems often to depend upon the patient's residing in a particular atmosphere, or situation. This is so much the case, that the disorder sometimes has the appearance of depending on epidemic causes. Instances have been known of almost all the ulcers and wounds in large hospitals, becoming simultaneously affected with grangrene.

The terms *dry* and *humid* gangrene ought to be abandoned, as of no practical utility. The kind of mortification also, which the French† have termed *white*, from the parts not undergoing much change of colour, is a distinction equally uncommon and useless.

TREATMENT OF THE VARIOUS KINDS OF MORTIFICATION.

In every case of mortification, there are two grand curative indications: viz. 1. To put a stop to the progress of the mischief; 2. To promote the separation of the mortified from the living parts.

The extent of death in the part affected may probably be considerably influenced by the mode of treatment, adopted during the incipient stage of mortification, termed gangrene. When the disorder is the effect of inflammation, we are bound to believe, that the living circumference is inflamed in the highest degree. Fomentations and warm emollient poultices are very commonly applied; but, as heat always increases action, they should not often be used in this state. Cold, too long applied, is apt to debilitate; but, it previously lessons vascular action, the grand object in view.* The lotio aq. litharg. acet. is as good an application as can be used; but, it is to be remembered, that here, as in cases of common inflammation, the feelings and comfort of the patient must determine, whether warm, or cold, applications are best.

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* O'Halloran on Gangrene and Sphacelus, p. 33.

† Quesnay, Traité de la Gangrène.

As the pain, attending the change from violent phlegmonous inflammations into gangrene, is excessive, opium, and, when there is a tendency to delirium, camphor should be administered.

When the gangrenous part is converted in a black, insensible, fibrous mass, it is of little consequence what is applied to it; the living circumference then claims almost exclusive attention.

If the application of cold, and the internal exhibition of opium and camphor, assisted by such treatment as is adapted to the inflammatory fever, check the further expansion of gangrene and sphacelus, the lymphatics next remove the particles of matter, connecting the slough with the living body, and suppuration takes place in the interspace. The result is an entire separation of the mortified portion.

The disposition to mortification often extends a considerable way from the part already dead. The coagulation of the blood, in the large vessels leading to the slough, proves, that the mischief is not confined to what is externally visible. Hence, the united experience of surgeons, in all ages, has determined, that no operation, for the removal of a mortified limb, can warrantably be performed, before a stop is put to the expansion of the disorder, and a line of separation is seen between the dead and living parts.

When the sphacelation is complete, and its progress has stopped, a linseed poultice, containing finely powdered and recently burnt charcoal, is a most eligible application. The *cataplasma aeratum,* one of the formulæ of St. Bartholomew's Hospital, is also one very much approved.†

Stimulating antiseptics, such as spir. vini camph. ol. terebinth. &c. may diminish the fetid effluvia; but, they are too apt to create a renewal of sloughing, when they extend their action to the living parts.

When the inflammation, surrounding the sphacelus, has abated, the patient should be allowed the most nutritious food, with bark, aromatic confection, wine, and fermented liquors. If delirium should occur, camphor, musk, or valerian ought to be administered, and a blister applied to the head.

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* "All the applications should be cold." Hunter, on Inflammation, &c. p. 9.

† ℞ Farinæ Tritici, Cerevisiæ Spumæ *Yest* dictæ, sing. ℔ss: Misce et calori modico expone, donec effervescere inceperit.

Opium and the mistura cretacea are the best medicines for diarrhoea.

The separation of a slough should always be left as much as possible to nature. The surgeon should only interfere in removing parts entirely detached. It is impossible to say what little violence will often renew the spreading of mortification; and when we consider the debilitated and disordered condition, into which the whole system is thrown by the death of a part, it is a matter of no surprise.

Bark, conjoined with the vitriolic acid, has been very generally considered as a most effectual remedy for stopping the progress of mortification. But, it is highly wrong to employ bark indiscriminately in all cases. In some, it is unnecessary; in some, ineffectual; in others, hurtful.

When mortification happens from an external local injury in a sound constitution; when it no longer spreads, and the living margin appears red, for a small distance from the line of separation; bark is clearly unnecessary.

Mortification is attended with fever, of three kinds: 1. Sympathetic inflammatory fever. 2. One accompanied with extreme debility, being probably of a typhoid nature. 3. One depending on derangement of the chylopoietic organs.

The first takes place when the mortification is the consequence of healthy acute inflammation, which has been produced by an external injury in a healthy constitution. Here bark is usually hurtful.

The second fever certainly requires bark. In the third, however, as the indication is to empty the primæ viæ, bark is not likely to prove serviceable.

From the observations already delivered, it must be obvious, that sometimes inflammation has less share in the origin of the mortification, than some other proximate cause, which may demand the administration of bark. In the course of the case, also, circumstances may change so much, that though this medicine is at first improper, it may afterwards become useful.

So long as sympathetic inflammatory fever, and local inflammation, are co-existent with mortification, the antiphlogistic treatment is indicated. But much circumspection is necessary in its adoption; for the change from the inflammatory into a low fever, with extreme debility, is commonly in these cases very sudden. Evacuations, including venesection, may be employed in young robust persons; but, very seldom in other subjects. This treatment is sometimes necessary in violent burns.

When mortification arises without any marks of previous inflammation, but, preceded by terrible pains in the part, bark is never of any use. Opium is here, perhaps, the only beneficial medicine. The mortification of the toes and feet, arising in this way, is ably shewn by Mr. Pott to be only benefited by this one remedy. The topical applications should be of an emollient, unirritating kind.

When bark is indicated, and it occasions diarrhœa, a few drops of the tinct. opii should be added to each dose.

Bark sometimes disorders the stomach. In this case, it should be given in the form of a very subtile powder with wine; or the tincture, or infusion, may be exhibited.

The diet must conform with the plan of treatment. When antiphlogistic means are adopted, nothing but vegetable food, and diluent beverages, should be allowed. In other cases, the diet should be nourishing, together with wine, porter, brandy, cordials, &c.

Particular attention should be paid to cleanliness. Spicy drinks, taken cold, are highly commendable.

When mortification arises from pressure, nothing avails without removing the cause, and even the removal of that, after a certain period, will not prevent the disorder. In most cases, cushions placed in particular situations under the patient, and change of posture, are the grand means of prevention. The local treatment does not differ from that of other mortifications.

In every case of sphacelus, the surgeon should endeavour to find out, and, if possible, remove the cause. This sometimes cannot be discovered; frequently it is known, but cannot be removed.

The progress of mortification often stops spontaneously, especially, when it arises from external injuries.

Some external injuries are inevitably followed by mortification. Here amputation is frequently proper in the first instance; the wound of the operation being less dangerous than an extensive and spreading sphacelus.

When the substantial part of the lower extremity has mortified, the formation of a serviceable stump generally renders amputation requisite, as soon as the spreading of the disorder has ceased. Sometimes, however, it is prudent to delay the operation a little, until the system has revived from its dejected state.

In a few cases, nature removes all necessity for amputation, by producing a speedy separation of the dead parts, and healing the extremity of the limb. Thus, Mr. Kirkland makes mention of a man, who, in consequence of a violent contusion of his leg, was affected with a prodigious swelling of the gastrocnemius muscle, and the toes, in the course of a few days, became quite insensible. The toes and foot were soon completely sphacelated;

the dead parts were detached from the living at the ankle; and the patient got quite well. The same author records another example, in which a patient, who had a continued fever, was attacked with a perfect sphacelus of the right foot in one night. Under the use of antiseptics, the dead parts were detached, and the living ones soon healed.*

CHAP. VI.

ERYSIPELAS.

ERYSIPELAS is a kind of inflammation most frequently affecting the small vessels on the surface of the body. It is more commonly, as Mr. Hunter observes, a cutaneous inflammation, than one of parts more deeply situated; although, in some constitutions, every inflammation, wherever it exists, will most probly be of this kind. However, Mr. Hunter very justly remarked, that the skin appears to be the most susceptible of erysipelas, because the affection will spread over a prodigious surface of skin, without extending, at least, in most instances, to the cellular membrane underneath.

LOCAL SYMPTOMS.

The part affected is of a scarlet colour, tinged with yellow, and it does not exhibit so deep a red as that of phlegmon. Erysipelas is very prone to spread rapidly to a great extent. Towards the termination of the complaint, the yellow cast is plainly discernible. The swelling is neither so hard, so elevated, nor so circumscribed, as that of common inflammation. The skin has a glossy, smooth appearance, and, on being touched with the finger, the scarlet colour disappears where the pressure is made, leaving a white spot, which, however, is almost immediately effaced when the finger is removed. The pain is of a burning, itching kind.

This inflammation frequently changes its situation gradually, growing well on one side, but extending itself on another. Sometimes it disappears entirely at one place, and makes its attack on some other.

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* Kirkland's Enquiry into the present state of Medical Surgery, Vol. 2, p. 380.

The extravasation is not so great, as in phlegmon and œdema; nor, is it of that kind which produces adhesions, which, according to Mr. Hunter, would commonly be unnecessary: for, erysipelas seldom ends in suppuration, and their chief use is to prevent the matter from being diffused in the cavities of the cellular substance.

In true erysipelas, there is no throbbing of the part affected, as in cases of phlegmon; and, when erysipelatous inflammation runs along the skin, the affection has a determinate edge, and does not lose itself, gradually and insensibly in the skin beyond, as healthy phlegmonous inflammation does.

The skin, when affected with erysipelas, seems to the touch less pliable, than natural, and only a little thickened.

As the disease gets well, the cuticle peels from the part.

Erysipelas may be conjoined with phlegmon, in which case, the inflammation is of a deeper red colour; the swelling is greater, and the pain more acute. There is a throbbing in the part, and the pulse is full and hard.

There is also a particular species of erysipelas, (St. Anthony's Fire) in which small vesicles arise, containing an irritating fluid. These burst, and scabs are formed, beneath which suppuration takes place.

True erysipelatous inflammation seldom suppurates: it generally ends in resolution. Very violent cases sometimes cause gangrene.

In erysipelas, there is no extravasation of coagulating lymph into the interstices of the part affected, consequently adhesions are seldom formed, so that the expansion of the complaint is not limited, nor are any boundaries set to the matter, when abscesses unfortunately occur. Hence suppuration in these cases is a serious evil, and seldom happens without producing considerable sloughing of the fasciæ, tendons, and cellular substance, beneath the skin. The latter part, being highly organized, frequently escapes, even when the sloughing of the other less vascular parts is very considerable.

Suppuration, and mortification, are more apt to occur, when erysipelas extends more deeply than common, so as to affect the cellular membrane. In this state, air, matter, and sloughs, are all produced together, under the skin, and, on handling the part, a strange feel is communicated, neither like that of a fluctuation, nor a crepitation. There being no adhesions, the matter finds an easy passage into the cavities of the cellular substance, and induces the same kind of suppuration wherever it spreads. As mortification always follows these abscesses, putrefaction ensues, and renders the discharge excessively offensive.

Erysipelas in the face, *cæteris paribus*, is more dangerous, than in any other external situation.

Erysipelas occurs more frequently in summer, than winter, particularly in hospitals. It is more frequently occasioned by wounds upon the head, than any other injuries. In these instances, it often begins round a wound upon the scalp, and extends over the whole head and face. Mr. Hunter mentions his having seen it advance thence to the neck, shoulders, and body, to the very finger-ends, and those of the toes. In proportion as the affection advances, it quickly gets well behind, the skin peeling off the cured parts.

Some have doubted, whether erysipelas is inflammation; but, all the symptoms, viz. the redness, heat, swelling, and painful soreness of the part, &c. decidedly shew, that it is an inflammatory affection. As far as I can judge from experience, it is also benefited by cold local applications, which, we know, are generally serviceable to all inflammations. The constitutional causes, however, by which erysipelatous inflammation is generally influenced, and the peculiarity of the local affection itself, demand some particularity in the treatment, as will be presently explained.

CONSTITUTIONAL SYMPTOMS.

In a mild attack of erysipelas, no fever is perceptible during the disorder; but, the pulse is generally a little accelerated before its commencement.

In ordinary instances, erysipelas begins with fever, lowness of spirits, prostration of strength, loss of appetite, &c.

In a more severe attack, an unusual languor, heaviness in the limbs, head-ach, loss of appetite, nausea, actual vomiting, and oppressions about the stomach, precede the appearance of the local complaint. About the third day, the erysipelas commonly comes out, when the febrile symptoms cease.

The most violent form of erysipelas is most often seen attacking the face. It is preceded by excessive disturbance of the constitution. Even delirium sometimes occurs, which does not cease on the eruption of the erysipelas, but continues for a greater, or less time afterwards; but, mostly ceases when the erysipelas disappears, about the eleventh day.

CAUSES.

Erysipelas seems in general to be intimately dependant on the state of the constitution; and this may account for the greater efficacy of internal remedies, than of topical applications, in the treatment of the disorder. Persons in the habit of drunkenness, and other species of intemperance, and who, in a state of intoxication, meet with local injuries, often have erysipelatous inflammation in consequence of them. Other subjects, who lead more regular lives, when they meet with similar injuries, experience healthy inflammation.

That erysipelas sometimes arises in constitutions, with which we can find no evident fault, is certainly true. Nay, that the affection may even, in some instances, be altogether independent of constitutional causes, seems very probable, on considering, that it is the common course of the disease to be actually getting well on one side, as fast as it is spreading on the other.

An anonymous writer, who has noticed a former edition of this work, argues against intemperance being a cause of erysipelas, by stating, that, many women and children, not liable to such an imputation, are sometimes affected. However, when drunkenness, and other intemperances are assigned, as causes conducive to erysipelas, it is not meant, that they are exclusively so; and though women, who lead regular lives, and also children, are sometimes affected with the disorder, yet, who will contend, that they are attacked with erysipelas on meeting with local injuries, so often either as the drunkard, or the person whose constitution is impaired by every species of voluptuousness? In this sentiment, I am sure I shall be joined by all who have had the same opportunity, as I have had, of seeing the numerous persons, who are every year brought into St. Bartholomew's Hospital, in a state of intoxication, with wounds and bruises of their head and face. How many more of these subjects, whose lives are a continual scene of riot and debauchery, have erysipelas, compared with any other class of people, similarly circumstanced, in regard to injuries, which they receive?

Every man of experience will consider no constitution, as exempt from erysipelas; and, the above statement is, in no manner, invalidated, because females and children, leading regular lives, are sometimes attacked. They may still be under the influence of internal causes, beyond our investigation.

Erysipelas often has its principal source in a disordered state of the chylopoietic viscera, and, perhaps, particularly in a wrong state of the bilious secretion. If this conjecture, now strongly maintained by Richter, &c. be correct, Galen's doctrine was not very far from the truth.

As for the suppression of perspiration, with which erysipelas is connected, I am inclined to regard it as an effect, though Richter suspects it may act as a cause; because, according to this author, the erysipelas never yields, till the patient begins to perspire; an assertion which may be doubted.

Besides the constitutional erysipelas, however, there is certainly another species, which may be imputed entirely to a local cause. Thus, the irritation, produced on the skin by old rancid ointments, often occasions an erysipelatous affection; and so, perhaps, do some slight kinds of burns.*

CONSTITUTIONAL TREATMENT OF ERYSIPELAS.

The mild erysipelas is relieved by any gentle diaphoretic. A few doses of nitre to promote the ordinary evacuations; the breathing of pure, fresh air; and the antiphlogistic regimen, are also very serviceable.

But, as in most cases, the bowels are out of order, it is necessary to give a mild purgative, such as the sodæ sulphas, or pulv. rhæi.

Topical bleeding with leeches is often advisable; and sometimes venesection is proper, when the case is conjoined with phlegmon; when there are symptoms of inflammatory fever present; when the marks of bilious disorder are not considerable; and, particularly, when the face is the seat of the attack.

While, however, copious bleeding, and free purging, are highly proper and useful, in cases of phlegmon, they are seldom admissible in those of erysipelas. Indeed, the use of the lancet may be regarded, as generally hurtful, and no blood ought ever to be taken away, when the abdominal viscera are much disordered, even though the patient be young.

In severe erysipelas, however, emetics are highly proper; and, whether this state of the disorder be connected with a derangement of the secretion of bile, or not, experience is much in favour of the efficacy of this kind of evacuation.

Cremor tartari, natron vitriolatum, manna, and other mild purgatives, are the only ones allowable, and should be given with small doses of the antim. tartarizatum. The latter remedy will keep the skin moist, which is generally reckoned a desirable object.

When the patient has a very foul tongue, a bitter taste in his mouth, and a propensity to vomit, and the above gentle purgatives do not quite remove the symptoms of disorder in the viscera, an emetic becomes necessary, whether the local affection be considerable or not. But, this measure is indicated in every severe case, and ought even to be repeated, except in cases, in which suppuration, or sloughing, is likely to happen.

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* See Richerand's Nosographie Chirurg. Tom. 1, p. 119. Edit. 2.

In the treatment of erysipelas from a bilious cause, the celebrated Desault used to administer, in the first instance, a grain of emetic tartar, dissolved in a liberal quantity of water. The symptoms are said to have frequently subsided immediately after the effect of this medicine, even though a mere increase of the perspiration and urine was occasioned. When the case proved more obstinate, the emetic beverage was continued, till the febrile disorder and bitterness of the mouth were removed. The cure was then completed with a dose or two of the mildest purgatives. The patient, after a few days, was not kept on a very low regimen, which, at least, in hospitals, was considered by Desault as prejudicial.*

When purgatives only produce a temporary abatement of the visceral disorders, the vitriolic acid often proves beneficial.

Bark is advised, for all stages of erysipelas, by most of the writers on surgery. When great weakness prevails, or when suppuration, and gangrenous mischief are prone to take place, bark is certainly indicated. Also, if any particular constitutional disorder should demand this medicine, it should be given. But, it may be doubted, whether it is of any real service to ordinary erysipelatous complaints. Great prostration of strength, and suppuration and gangrene of the parts, may also require, besides bark, cordial medicines, opium and camphor, wine, porter, a nutritious diet, &c.

LOCAL TREATMENT.

Erysipelas is certainly more capable of being diminished by internal, than external treatment.

Many surgeons decry both warm and cold moist applications, and recommend keeping the part dry, and in a moderate equal warmth, secluded from the air. Such practitioners think, that a gentle diaphoresis from the inflamed part forms one principal indication, and, for this reason, they cover the local affection with flannel, or dry mealy powders.

The aversion to cold lotions arises probably from an unfounded fear of metastasis, and the evils of driving inward the disease. I have generally been in the habit of applying the same kind of topical applications, viz. cold lotions, both to erysipelas and phlegmon, and I have never had reason to repent such practice. Emollient poultices, however, should never be applied; for, they sometimes induce suppuration, which, in these cases, is attended with serious consequences.

The same reason ought, perhaps, to keep us from pursuing a common method of applying to the parts linen, wet with a strong decoction of elder flowers, or white poppies. Such applications, if used at all, ought in my opinion to be employed in a cold state.

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* Œuvres Chirurg. de Desault, par Bichat. Tom. 2, p. 588.

When the fever, and most of the local redness have subsided, and only a discoloured œdematous swelling continues, topical applications, containing camphor, are the best. The vesicles, which sometimes form, should be punctured with a needle, and their fluid contents imbibed with a sponge.

When mortification happens, the treatment is to be regulated by the considerations noticed in the preceding chapter.

Some writers recommend the two worst kinds of local applications to erysipelas, which could possibly be mentioned, viz. rubefacients, and warm cataplasms. With regard to the former, what theories can lead these authors to wish to stimulate and redden the skin more, than the complaint itself does, without any aid of the surgeon. As for warm cataplasms, which can only promote suppuration, the most pernicious thing that can happen, they are as wrong in principle, as they are hurtful in practice.

We must not wonder, however, at finding these methods recommended in a few modern books, and supported by the old appeal to experience; for, when practitioners are blinded with their fears of repelling inflammations, and causing metastases, they may be said to have lost their surgical senses, and fallen into a kind of professional delirium. Their patients sometimes escape, in spite of the mischief they do, and the cases are recorded in the histories of surgery, as unquestionable cures, effected in a superior manner, and by matchless means.

CHAP. VII.

OF THE FURUNCULUS, OR BOIL.

ITS SYMPTOMS AND NATURE.

THE boil is a circumscribed, very prominent, hard, deep-red, painful, inflammatory swelling, not exceeding, in general, a pigeon's egg in size.

It is seldom attended with fever, except when very large, or when several tumours occur at the same time.

It is the disposition of a boil to enter into an imperfect kind of suppuration. The matter is contained in a cyst, composed of the cellular substance; and when the tumour bursts, it does not readily heal on account of this sort of capsule continuing behind.

Boils somewhat resemble carbuncles in their nature; but, are trivial complaints, compared with the latter.

CAUSES.

Boils appear to arise mostly from a particular state of the constitution, and to depend upon internal causes. Hence, the complaint is only common in children and young persons. In general, a boil presents itself singly; but, sometimes a great number shew themselves at once. This is said to happen more particularly in children, or immediately after the termination of an acute disease.* At all events, these facts tend to indicate the agency of internal causes.

TREATMENT OF THE BOIL.

As it seems to be the course of nature, that swellings of this kind should suppurate, though imperfectly, and, as an induration constantly remains after an incomplete resolution of them, we ought generally to promote suppuration by using external emollient applications.

There are, however, a few exceptions, in which resolution may laudably be attempted. In such instances, vitriolic acid mixed with honey; alcohol; and ol. camph. are recommended as topical applications.

In the majority of cases, emollient poultices are the eligible remedies, to which henbane, hemlock, or opium, may be united, when the pain is intolerable.

The boil is very tardy in bursting; but, it does so at last. It may, in general, be advantageously opened with a lancet, long before this event. The contents should then be squeezed out, and every portion of the cyst extracted, if it can be done with ease, and without giving much pain. When this has been accomplished, the cure soon follows, if, after using a poultice a few days longer, common dressings are applied. The case might be lengthened very considerably, by putting the hydrargyrus nitratus ruber into the cavity, as a late author recommends, in cases where the quantity of "corrupted cellular membrane is considerable."

Gentle aperients, and the antiphlogistic regimen, which are proper in all local inflammations, are not to be omitted in this case.

When the boil is large, and excessively painful, opium is proper; and so is bark, if the state of the system demands its exhibition.

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* Pearson's Principles of Surgery, p. 72, Edit. 2.

Camphorated mercurial ointment, and gum ammoniacum, are proper applications for discussing any induration, which may afterwards remain.

Some writers have mentioned a chronic kind of boil, as frequently occurring in persons, who have suffered severely from the use of mercury, or from the measles, lues venerea, scrofula, or small pox.* Its chief difference seems to be the slowness, with which it suppurates; and there is nothing particular in its treatment.

CHAP. VIII.

OF THE ANTHRAX, OR CARBUNCLE.

THE carbuncle is a malignant kind of boil, which occasions a gangrenous suppuration beneath the skin, and is often attended with great danger. It is one of the symptoms of the plague, and other malignant fevers. In this country, we find, that the disorder is usually preceded, and attended by the same class of symptoms, which are observable in typhus fever.

Its progress to the gangrenous state is sometimes rapid; at other times, slow. Its size varies considerably. It has been known to be as large as a common plate. Considerable local pain, and induration, always attend the disease.

The swelling is not much elevated above the level of the surface of the body; the skin, over the middle of the disease, assumes a dull brown, red colour; and, what is always very remarkable, it becomes so hardened and thickened, that, when handled, it feels like brawn.

As the complaint advances, several apertures generally form in the tumour. Through these openings, a yellow, greenish, bloody, irritating discharge flows out, while the great mass of the matter, and sloughy cellular membrane, still continues confined, and the gangrenous mischief, in consequence of an early, free opening, not being made, often spreads to such an extent, that the patient perishes.

Indeed, the ravages, attendant on carbuncles, are at their deepest part, or their base, which always occupies a much greater extent, than the superficial portion of the disease.

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* See Munnick's Praxis Chirurgica, cap. 3, p. 19.

Frequently, there is very extensive sloughing deeply situated, when no sign of mortification can be externally discerned.

It is one of the characters of a carbuncle to be tardy in bursting, and then only to do so, by small openings, which are quite inadequate to giving proper vent to the matter and sloughs.

Sometimes several carbuncles occur in the same person, at the same time.

The concomitant fever, at first, is, now and then, of the sympathetic inflammatory kind; but it is soon observed to lose the strong actions of that, and to assume the typhoid nature.

A species of carbuncle is said to be particularly common, and to prevail, as an epidemic affection, in some of the southern provinces of France, especially, Burgundy, and in some villages of the department des Basses Alpes.*

Carbuncles seem mostly to arise from internal causes, being generally preceded, connected, and accompanied with serious constitutional illness. Great prostration of strength, violent head-achs, sickness, loathing of food, and a variety of low febrile symptoms, are the common forerunners and companions of the local disorder. The anthrax is well known to be among the symptoms of the plague, and, in this country, it is often attended with severe indisposition, not unlike the worst sort of typhus fever. I think, in this metropolis, carbuncles are mostly seen in patients, who are somewhat advanced in years, and who have impaired their constitutions by free living.

A modern writer,† mentions his having frequently seen the anthrax attack the face, and occur in poor children, who have lived on bad food, and in close damp situations. I suspect, however, that he describes the kind of carbuncle, to which I allude, under the name of *pustule maligne*.

TOPICAL TREATMENT.

The openings, which form in the tumour, are sometimes numerous, but so small, that the matter cannot readily escape. In short, as these ulcerated apertures are tardy of formation, and, when produced, do not answer the purpose of giving free vent to the contents of the tumour, it is advisable to make an early, and free, incision into every carbuncle.

An opening of this kind having been made, the surgeon, should squeeze out as much of the matter and sloughs, as can be well done, without giving too much pain; for, the spreading of the gangrenous mischief in the cellular substance seems greatly to arise from the matter, and sloughs, first formed, being allowed to remain too long undischarged from the swelling.

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* Richerand's Nosog. Chir. Tom. 1, p. 126, and 129. Edit. 2.

† Idem, Tom. 1. p. 125, Edit. 2.

An emollient poultice is then to be applied. The matter and sloughs of cellular substance are now discharged, and make room for granulations, which fill up the cavity. The pain and hardness next gradually diminish, and the cure is soon perfected. In other instances, the patient's constitution sinks; no healthy changes occur; and death soon follows.

The French surgeons speak in favour of an early application of caustic to the swelling, as tending materially to prevent the extension of the disease.*

CONSTITUTIONAL TREATMENT.

As the carbuncle is most frequent in old persons, whose constitutions have been impaired by voluptuous living, the local disease, influenced by the general disorder of the system, often assumes a dangerous aspect.

I saw, in the summer of 1808, a very terrible case of carbuncle, in St. Bartholomew's Hospital. The patient was an elderly woman, whose strength was reduced to the lowest degree imaginable. I should guess, that Mr. Ramsden squeezed full half a pint of matter and sloughs out of the opening which was made; a proceeding which, in my opinion, saved the patient's life. This carbuncle occupied all the back of the neck.

Bark, opium, and camphor, are almost always necessary, for the relief of the weakness and irritability. Wine, cordial medicines, porter, and a generous diet, are also indicated.

When, as now and then happens in the beginning of the disease, strong sympathetic inflammatory fever prevails, venesection, mild saline purges, and the antiphlogistic regimen, are proper. But, the low state of the constitution seldom admits of blood being taken away, and cordial, aromatic, and tonic medicines are commonly such as are indicated.

While the pain is exceedingly severe, opium should always be given, and in repeated doses, so as to keep the system under its influence.

In cases, in which the strength is not exceedingly depressed, when any good effect can be expected from purgative medicine, or even an emetic, the practitioner should not be afraid of making trial of these means. They are, indeed, always prescribed by Richter, when the abdominal viscera do not execute their functions well.

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* Méthode de traiter les morsures des animaux enragés, &c. suivie d'um Precis sur la pustule maligne, par M. M. Enaux et Chaussier. Dijon, 1785.

The prognosis, in cases of carbuncle, depends very much on the size, and situation, of the swelling; on the number of such tumours; and, above all, on the state of the constitution.

If, together with a carbuncle of considerable magnitude, there is very great prostration of strength, frequent vomiting, delirium, &c. the danger is exceedingly great.

CHAP. IX.

ŒDEMA.

ŒDEMA is a preternatural accumulation of an aqueous fluid in the interstices of the cellular substance of a part. It is the same sort of disease, as anasarca, only less both in degree and extent.

The tumour is uncircumscribed. The skin of the swollen part retains its natural colour: if at all changed it is rather paler. The part has a cold feel, and the pressure of the finger occasions an impression, or *pitting*, which remains some time, and disappears slowly. There is no acute pain; but, there is an uneasiness, or sense of weight, and tightness. When the œdematous limb is in a depending posture, the magnitude of the tumour is increased; *et vice versa.*

In a few rare cases, the tumour is quite circumscribed, and of remarkably small extent: Mr. Pott mentions his having seen an affection of this kind, entirely confined to one side of the skin of the scrotum. This is to be wondered at, as the fluid is situated in the common cellular substance.

Sometimes, œdema is conjoined with erysipelatous, or phlegmonous inflammation.

It was probably the latter case which Mr. Hunter called *œdematous inflammation*, and which is attended with an extravasation of water, and the appearance of common inflammation, the skin having a scarlet colour, which, however, is more diffused. The effused fluid being principally serum, the swelling is even more diffused, than the inflammation itself. The part affected is very painful; but, is not attended with much of the throbbing sensation, which accompanies common phlegmonous inflammation. The affection seems only superficial, though it probably extends to some depth. According to Hunter, the difference, between this and common inflammation, arises from the principle of inflammation acting upon a dropsical disposition, which is always weak. A stronger constitution would have produced the adhesive stage of inflammation, from the same cause. It is more lasting, than common inflammation, and seldom suppurates. Should it do so, the cellular substance, in the interstices of parts, is apt to slough, and extensive, uncircumscribed abscesses to occur.*

CAUSES.

Œdema may depend on constitutional, or on local debility. Contusions, sprains, the long-continued use of relaxing poultices, and washes, are often local causes of œdema. A part, which has undergone acute inflammation, often remains œdematous for some time afterwards. In all these instances, the tone of the vessels being impaired, is the cause of the disease. The complaint is very often owing to some impediment, preventing the return of blood towards the heart. The pressure of the gravid uterus on the iliac veins, often renders the lower extremities œdematous. Aneurisms frequently compress the chief veins of an extremity and bring on this affection. Œdema must in many instances be a mere symptom of other diseases, which operate as a cause. It accompanies ascites, hydrothorax, deeply seated abscesses, &c. &c.

TREATMENT.

No cure can be expected till the particular cause has been removed. To promote the absorption of the extravasated fluid, and to re-establish the original tone of the vessels, are always, however, grand indications.

The limb should be kept in an horizontal position. Frictions made on the part with flannel, fumigated with aromatic vapours; the application of camomile flowers, and preparations containing camphor; and a moderately tight roller; tend strongly to rouse the absorbents into action.

The operation of these means is considerably assisted, by giving internally purgatives, diuretics, and emetics.

If the tumour should not soften under this plan, but become so tense, as to occasion pain, inflammation, and the danger of gangrene, the fluid may be discharged by means of small punctures. These however, are not void of danger; for all wounds, in dropsical constitutions, and parts, easily become gangrenous. The punctures, therefore, should be as small as possible.

It is chiefly, however, in cases of anasarca, or those attended with a general dropsy of the whole body, and an extensive extravasation of water in the cellular substance, that scarifications become necessary, and not for the local swelling, implied by the term, œdema.

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* Hunter on the Blood, &c. p. 269.

When the œdematous part is inflamed, every thing in the least irritating should be removed. No bandages should now be employed. The limb should be placed in an horizontal position, and covered with the lot. aq. litharg. acet. Cooling purgatives are to be given, and the antiphlogistic regimen observed. Such inflammation is apt to occasion dangerous sloughing.

Electricity is useful, in cases unattended with inflammation.

CHAP. X.

BURNS.

BURNS may be divided into four degrees:

1. In the mildest, there is but a slight redness without swelling, and only a gentle inflammation is excited, that shortly subsides.

2. In the second degree, the redness is attended with swelling; the pain is severe; and if the burn be of much extent, there is fever. The inflammation is acute, but it commonly ends in resolution.

3. In the third degree, vesicles, containing a clear, or yellow fluid, arise, either in a sudden, or gradual manner. The sympathetic fever is severe; the pain is intolerable; and suppuration can seldom be prevented.

4. In the fourth, the burnt part is mortified. This happens, either at the moment of the accident, or in consequence of violent inflammation.

The quantity of injury depends on the degree of heat in the burning substances; on the duration and extent of their application; and on the sensibility of the burnt part.

The danger is proportioned to the extent as well as to the violence of the burn; hence, even cases of the fourth kind, and of little extent, may be insignificant, while others of the first description, and of great extent may be very perilous.

Scalds are frequently dangerous from their extent; but, burns may be not only perilous from this cause, but also from the depth to which the parts are injured, or destroyed.

As heated fluids part with their caloric in being diffused, scalds are often attended with various degrees of injury at different parts.

Vinegar has obtained some considerable repute as an application to burns and scalds. Some accounts of its good effects were transmitted to Mr. Hunter, by Mr. Cleghorn, a brewer in Edinburgh, and the former gentleman thought the information worthy of being published in the second volume of the Medical Facts and Observations.

The vinegar, a little warmed, is to be applied immediately after the accident, and the application continued for some hours by the most convenient means, until the pain abates. If the pain returns, the vinegar is to be repeated. When the burn has been so severe, as to have destroyed any parts, they are to be covered with a poultice, as soon as the pain has ceased. The latter application is to remain on the injured part, for six, or, at most, eight hours. On its being removed, the part is to be entirely covered with very finely powdered chalk, until no moisture can be seen on the surface of the injured place, and then a fresh poultice is to be applied. The same mode is to be pursued every night and morning, till the cure is completed. When poultices relax the granulations too much, an ointment, containing white lead, is recommended; but the chalk is still to be used next the sore.

Mr. Cleghorn used to allow his patients to eat animal food, which was dressed in a plain manner, nor did he object to their taking wine, spirits and water, ale, or porter, with moderation. He never had any occasion to order bark, or any internal medicine whatever; and he never found occasion to bleed, except in one instance. Costiveness was removed by boiled prunes, mild, nourishing, laxative food, and sometimes glysters; but, purgatives are much condemned.

Sir James Earle has strongly recommended the employment of ice, as an application to burns and scalds. When, however, it cannot be procured, he advises, in its stead, the coldest water. In summer, he suggests making the water cold for this purpose, by means of a solution of sal ammoniac and saltpetre, as is often done on other occasions. Sir James says, that the cold fluids may be used, either by plunging the burnt parts into them, if the limbs have received the injury; or by applying scraped potatoes, wet linen, &c. and he recommends such means not to be discontinued as long as heat and pain remain.

Whoever prefers treating burns on the antiphlogistic plan, needs no further information, than what is contained in the chapters on inflammation and its consequences.

Burns in the neck are frequently followed by such a contraction of the cicatrix, that the head becomes permanently drawn to one side. This deformity may be lessened, though it cannot always be prevented, by confining the patient's head during, and for some time after, the process of cicatrization, in a suitable position, by bandages, and other means.

Operations, undertaken for the purpose of dividing the contracted skin, seldom produce any lasting good. However, I have seen some cases in which, with proper mechanical aids, the deformity was greatly and permanently lessened. Sir James Earle has recorded a fact of this kind, of which I believe I was an eye-witness; but, in this example, besides the contraction of the skin, the chin was drawn down and adherent to the breast. Sir James has given two engravings, shewing the degree of benefit obtained.

When the fingers, toes, and ears are burnt, dressings should always be kept between the sore surfaces, so as to prevent unnatural adhesions from forming.

When joints are burnt, they should principally be kept during the treatment, in the position in which they would afterwards be most useful, were an anchylosis to follow. However, perhaps the most prudent method is to endeavour to prevent the latter event by occasionally moving the joint with all due gentleness; but, when the evil cannot be hindered, the future position of the joint is a very important consideration.

Paré, Hildanus, and many modern writers, advise puncturing the vesicles, which arise in burns and scalds. As far as I have seen, no harm results from letting out the fluid by making small punctures; but I think Sir James Earle is perfectly right in condemning the removal of the cuticle, at least, in the first stage of the case.

CHAP. XI.

EFFECTS OF COLD.

WHEN a limb is merely frozen, without any impairment of its organization, it may often be recovered by the *gradual* communication of caloric to it. Experience has evinced, that the whole body may be in the same condition, having all its vital functions suspended, and yet be restored to animation. In this case, however, the gradual impartment of heat will not avail, unless the heart and large blood-vessels retain the power of action. But, since animation, suspended in consequence of cold, has been restored, as late as six days after the occurrence, neither hope, nor exertion should be abandoned.

When the whole body, or any part of it, is frozen, warmth should be communicated to it very gradually. If a limb, that is not actually frozen, but excessively cold, be suddenly heated, very violent inflammation is the result. The part swells, turns livid, and becomes affected with insupportable darting pains. When a part, actually frozen, is thus quickly warmed, the same symptoms arise, but in an aggravated degree, and they soon terminate in mortification.

In order to thaw a frozen limb, it is best to rub it with snow, until sensibility and motion return. If the ear, or tip of the nose, should be the part concerned, care must be taken to avoid breaking it. If snow be not at hand, ice-cold water should be used instead of it. As soon as marks of sense and motion are discerned, the frictions are to be made with brandy, oil of petroleum, oil of amber, tincture of myrrh, or camphorated spirit of wine.

The next object is to endeavour to excite perspiration by giving some mulled wine, and putting the patient to bed, in a chamber, where there is a fire. In this situation, he is to remain, until he begins to perspire, which is generally succeeded by a perfect recovery of whatever sensibility may have been lost.

When a part is almost in the state of gangrene, in consequence of improper exposure to sudden heat, sometimes its recovery may still be accomplished by immersing it in water of a temperature nearly as low as the freezing point. The part must be kept immersed, until the swelling, pains, and marks of discolouration begin to diminish, when frictions with brandy, &c. may commence, and the warmth be gradually increased.

This plan occasionally succeeds, when very little hope of its doing so can be indulged. If mortification cannot be avoided, the future treatment does not differ from what has been explained in the chapter on that subject. In this case, however, opium is pre-eminently useful.

The treatment of the whole body, deprived of animation by cold, is similar to that of a part. It is to be covered with snow, or placed in ice-cold water, in such a manner, that the mouth and nostrils be not obstructed, and care is to be taken not to break any part. In this way signs of vitality must be awaited. When these appear, strong volatiles and sternutatories are to be applied to the nostrils, and air is to be blown into the lungs. With a view of doing this more conveniently, tracheotomy may be performed. The practice of introducing tobacco fumes into the rectum is to be reprobated in every case of suspended animation. I should rather advise some warm wine to be injected, through a hollow bougie, down the œsophagus.

When the body has been thawed, and signs of returning animation increase, it is to be taken out of the water, rubbed with brandy, and conveyed into a warmer situation. Any diaphoretic drink should then be administered, and as soon as the patient has been well dried, he is to be put to bed, and remain there till he begins to sweat.

CHILBLAINS.

Their Symptoms, Varieties, &c.

A chilblain, in the mild state, is a moderately red tumour, occasioning heat and itching. The complaint after a time spontaneously disappears.

In a more severe state, the tumour is larger, redder, and sometimes of a dark blue colour. The heat, itching, and pain are so vehement, that the patient cannot use the part affected.

In the third degree, small vesicles arise on the tumour. These burst, leaving excoriations, which soon change into sores.. The ulcers secrete a thin matter, penetrate deeply, and are very slow in healing.

In the worst cases of chilblains, the inflammation ends in mortification, which is often preceded by the formation of bloody vesicles on the tumour.

CAUSES.

The sudden warming of a cold part, and the sudden cooling of a heated part, seem particularly conducive to chilblains; hence, parts most exposed to the vicissitudes of heat and cold, are most subject to the complaint; as, for instance, the toes, fingers, nose, ears, and lips. When a part is exposed to sudden cold, while it is in a state of perspiration, it is more likely to be affected with chilblains, than when thus exposed while simply warm. The most intense cold alone cannot produce true chilblains, though analogous complaints do remain in limbs, which have been frozen. The more irritable and tender the skin is, the more readily the complaint arises. Children, especially such as are subject to scrophula, young persons, females, and all who are brought up tenderly, who keep themselves warm, and unexposed to the air, and who perspire much in the feet, are particularly liable to chilblains.

TREATMENT.

One of the best applications to chilblains of the first and second sort, is ice-cold water. The part affected is to be immersed in it a few minutes, two or three times a day, until the complaint quite disappears. This event usually happens in less than four days. After every application the part is to be well dried, and covered with leather socks.

In some cases tonics and astringents have had the best effect. Such are diluted muriatic acid; the saturnine lotion; spir. vini camph.; tinct. myrrhæ; the alum lotion, vinegar, &c. In other instances, oleum terebinthinæ mixed with the balsam. copaivæ; and a mixture of two parts of spir. vini camph. and one part of aq. litharg. acet. have proved the best applications.

Suppurated chilblains require topical stimulants, such as warm vinegar; a mixture of aq. litharg. acet. and aq. calcis; or a salve containing the hydrarg. nitrat. rub.*

It is frequently necessary to touch the ulcers with the argentum nitratum.

Grangenous chilblains must be treated according to the rules explained in the chapter on mortification.

CHAP. XII.

WOUNDS.

BY a wound surgeons imply a recent, sudden breach in the continuity of the soft parts.

Wounds are divided into the *incised*, *punctured*, *lacerated*, *contused*, and *poisoned* kinds.

All bites and gun-shot injuries are complicated with contusion and laceration. The former are frequently rendered more serious by being at the same time poisoned.

The danger of wounds is proportioned to several circumstances highly deserving attention.

1. Their size. 2. The degree of violence done to the fibres in addition to their mere division. 3. The little power which the part has of repairing its injuries. 4. Its great importance

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* Hydrargyri Nitrico-oxydum. L. P.

to the constitution. I shall not mention age and kind of constitution, as these have influènce in all disorders.

1. The removal of a large adipose tumour is often accomplished without injuring any one part of importance, and yet the magnitude of the wound may occasion death.

2. A man cannot bear a large incised, and lacerated wound equally well; because in the latter case, the fibres are not only divided, but stretched, and otherwise injured. I have seen the integuments, covering the anterior surface of the tibia, torn in a straight direction, from the upper head of that bone, nearly to the foot: a rapid mortification of the limb took place, and the man died. Had this been a simple incision, such fatal consequences would probably, not have happened, since the wound of amputation, even when a bulky thigh is removed, is not frequently the cause of death. All contused and gun-shot wounds are, for this reason, more perilous, than if they were simple breaches of continuity.

3. Joints seem to possess but feeble power of repairing their injuries, and in such cases the whole constitution becomes very often dangerously disturbed. The system seems to sympathize with the local imperfection.

4. The slightest wound of a part, the functions of which are intimately connected with life, is often fatal. The brain, stomach, &c.

Wounds may be complicated with injury of considerable blood-vessels, and nerves; lodgment of extraneous substances, and poisonous matter in them; fractured bones; and a train of other circumstances, which will be hereafter explained.

From this preliminary matter, I proceed to describe the chirurgical measures to be adopted in

INCISED WOUNDS.

In these cases, there is frequently nothing to be remedied, except the simple breach of continuity, the cut fibres not having been stretched, contused, nor lacerated. When no artery of importance is divided, and no extraneous bodies are lodged in the wound, the duty of the surgeon consists in promoting the reunion of the divided surfaces without delay.

It often happens, however, that considerable vessels are injured, and then the bleeding demands primary attention.

CHAP. XIII.

MEANS OF STOPPING HEMORRHAGE.

WHEN an artery is wounded, the blood is of a bright scarlet colour, and gushes from the vessel *per saltum*, and with great rapidity. The blood issues from a vein in an even, unbroken stream, and is of a dark purple red colour.

It must be plain to every one, who understands the course of the circulation, that pressure, made on that portion of a wounded artery, which adjoins the wound towards the heart, must check the effusion of blood.

The current of blood in the veins, running in the opposite direction, requires the pressure to be applied to that side of the wound, which is most remote from the heart.

As pressure is the most rational means of impeding hemorrhage, so it is the most effectual, and almost all the plans employed for this purpose, are only modifications of it. The tourniquet, the ligature, the application of a roller and compresses, even agaric itself, only become useful in the suppression of hemorrhage, on the principle of pressure.

The structure of the blood-vessels is similar to that of other parts. They have their own arteries, veins, and absorbents, and are susceptible of inflammation, ulceration, &c.

There have been various theories, concerning the process by which hemorrhage from divided arteries is suppressed.

The celebrated French surgeon, Petit, conceived, that the bleeding was stopped by the formation of a clot of blood, which becomes adherent to the inside of the artery. The vessel served as a kind of mould for the coagulum, which lay over the mouth of the artery, like a cover, and was united to another clot within the vessel. Petit thought, that when the clot was properly supported by compression, it was sufficient to resist the impetus of the blood, and stop the bleeding.

Pouteau, another distinguished French surgeon, opposed the doctrine maintained by Petit, and imputed the cessation of hemorrhages to the pressure on the vessel, caused by the swelling of the surrounding cellular substance.

Kirkland believed, that bleedings were stopped, and the mouths of divided arteries, closed, by a natural contraction of the vessels themselves.

Mr. John Bell ascribes the spontaneous stoppage of bleeding to the cellular membrane becoming injected with blood, which coagulates, and serves as a kind of barrier, till the parts inflame, and a permanent closure of the vessel is accomplished.

Dr. Jones has lately published a valuable work, in which, after explaining, with strict impartiality, the errors and merits of all the principal writers, who have attempted to explain the causes of the spontaneous stoppage of bleeding, he relates a series of very accurate experiments. From these it appears, that, when an artery of moderate size is divided, the bleeding is stopped in the following manner.

An impetuous flow of blood, a sudden and forcible retraction of the artery within its sheath, and a slight contraction of its extremity, are the immediate, and almost simultaneous effects of its division. The natural impulse, however, with which the blood is driven on, in some measure, counteracts the retraction, and resists the contraction of the artery. The blood is effused into the cellular substance, between the artery and its sheath, and passing through that canal of the sheath, which had been formed by the retraction of the artery, flows freely outward, or is extravasated into the surrounding cellular membrane, in proportion to the open, or confined state of the external wound. The retracting artery leaves the internal surface of the sheath uneven, by lacerating, or stretching the cellular fibres, which connected them. These fibres entangle the blood as it flows, and thus the foundation is laid for the formation of a coagulum at the mouth of the artery, and which is completed by the blood gradually adhering, and coagulating around its internal surface, till it completely fills it up from the circumference of the centre.

The hemorrhage is checked by the effusion of blood into the surrounding cellular substance, and between the artery and its sheath; but particularly by the diminished velocity of the circulation, occasioned by the bleeding, and by the quick manner in which the blood always coagulates, when the action of the vascular system is much diminished.

Thus a clot over the mouth of the artery, within its sheath, called by Dr. Jones the *external coagulum*, presents the first complete barrier to the effusion of blood.

The mouth of the artery being no longer pervious, nor a collateral branch very near it, the blood, just within it, is at rest, coagulates, and forms, in general, a slender conical coagulum, which neither fills up the canal of the artery, nor adheres to its sides, except by a small portion of the circumference of its base, which lies near the extremity of the vessel. This coagulum is distinct from the former, and is named by Dr. Jones the *internal coagulum*.

In the mean time, the cut extremity of the artery inflames, and the vasa vasorum pour out lymph, which is prevented from escaping by the external coagulum. This lymph fills up the extremity of the artery, is situated between the internal and external coagula of blood, is somewhat intermingled with them, or adherent to them, and is firmly united all round to the internal coat of the artery.

Dr. Jones further informs us, that the permanent suppression of the hemorrhage chiefly depends on this coagulum of lymph; but, while it is forming within, the extremity of the artery is further secured by a gradual contraction, which it undergoes, and by an effusion of lymph between its tunics, and into the cellular membrane surrounding it. Thus, these parts become thickened, and so completely incorporated with each other, that one cannot be distinguished from the other; the canal and mouth of the artery becoming obliterated, and blended with the surrounding parts.

When the wound in the skin is not healed by the first intention, an exudation of coagulating lymph gives a covering to the end of the vessel, and separates it from the cavity of the wound.

In the inferior portion of the divided artery, the orifice of the vessel is generally more contracted, and the external coagulum is much smaller.

The extremity of the artery, as far as the first collateral branch, afterwards gradually contracts, till at length its cavity is completely obliterated, and its tunics assume a ligamentous appearance.

The external coagulum, which stopped the hemorrhage in the first instance, is absorbed in a few days, and the thickening of the parts, from the extravasation of lymph, gradually diminishes.

If the end of the artery be examined, at a still later period, it will be found to be reduced to a mere filamentous state, as far as its first branch, and the anastomosing branches considerably enlarged.

Another fact made out by Dr. Jones is, that, when the division of an artery has happened near a lateral branch, no internal coagulum is formed.

When an artery is punctured, or only partially divided, the blood is effused into the cellular substance, between the artery and its sheath, for some distance, both below and above the wounded part. On examination, a short time after the hemorrhage has stopped, a stratum of coagulated blood is found between the artery and its sheath, extending from a few inches below the wounded part to two, or three inches above it, and is somewhat thicker, or more prominent, just over the wounded part, than elsewhere.

In consequence of the space, between the artery and sheath, becoming filled with blood, and the latter part distended, the relative situations of the punctures in it and the artery are altered, and thus a coagulum of blood becomes confined by the sheath over the puncture in the vessel, and stops the hemorrhage.

But this is only a temporary barrier; and the permanent stoppage of the bleeding is effected by reparation, or obliteration.

Dr. Jones's experiments tend to shew, that if an artery be wounded only to a moderate extent, it is capable of re-uniting, and of healing so completely, that, after a certain time, the cicatrization cannot be discovered, either on its internal, or external surface; and that even oblique and transverse wounds, (which are attended with more gaping than longitudinal ones) when they do not open the artery to a greater extent than one-fourth of its circumference, are also healed so as to occasion little, or no obstruction, in the canal of the artery. In larger wounds, the vessel is rendered impervious by the effusion of lymph. In other instances, Dr. Jones found, that the partially divided part of the vessel becomes either torn, or ulcerated through.*

1. TOURNIQUET.

Ambrose Paré was acquainted with the utility of compressing the great vessels in the performance of important operations. It is surprising, that this information did not lead him to imagine an instrument adapted to the purpose. A French surgeon, named Morel, enjoys the honour of the invention of the tourniquet, which happened about 1674. But Morel's tourniquet was far from perfection, for it compressed equally every part of the circumference of a limb, not acting more on the situation of the main artery, than on any other point. Petit has immortalized his name, by devising the construction of the instrument on the principle now adopted in modern practice. The tourniquet, now in use, consists of a band and buckle, a pad, and a sort of brass bridge, capable of being elevated, and depressed, by means of a screw. The band is first buckled round the limb in such a manner, that the pad which is attached to the band, is placed exactly over the artery. The bridge, over which the band proceeds, is then to be raised by turning the screw, and thus a due degree of pressure is produced.

The advantages of this instrument are so considerable, that its first invention constitutes a great epoch in the annals of surgery. The pressure may be regulated with the utmost exactness, and it operates chiefly on the point, where the pad is placed, and where the main artery lies. The instrument does not require the aid of an assistant to keep it tense; it completely commands the flow of blood into a limb; it may be relaxed, or tightened in a moment; and when there is reason to fear a sudden renewal of bleeding, it may be left slackly round a limb, and, in case of need, made tense in an instant.

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* See a Treatise on the Process employed by Nature in suppressing the Hemorrhage from divided and punctured Arteries, &c. By J. F. D. Jones, M. D. 1806.

Its operation, however, is limited to the limbs, and as the pressure, necessary to impede the flow of blood through the principal artery, completely prevents the return of blood through the veins, its application cannot be made very long, without inducing gangrene. Nor does it have any direct effect in promoting the closure of the wound in the artery. Hence, its utility is confined to preventing, and putting a sudden stop to profuse hemorrhages, until the surgeon has had time to put more permanent means into practice.

The tourniquet is occasionally applied in a moderate state of tension, with a view of weakening, not suppressing, the current of blood into a limb. The common one does not accomplish this object advantageously, because, in retarding the return of blood through the veins, it has the effect of rendering the arteries more charged with blood, consequently any that are wounded more likely to bleed. In cases of aneurisms, where this plan is sometimes practised, the compression of the veins does infinite harm, by augmenting the œdema, and painful tension, so frequently attendant on that disease.

2. LIGATURE.

We have observed, that the tourniquet is generally employed, only as a temporary means of suppressing hemorrhage. Let us now take a view of other means, which have a permanent effect in the stoppage of bleeding, by producing a closure of the wounded vessels. The most important of these is the ligature, by which the most alarming effusions of blood may be restrained. With this the mouths of the divided arteries are tied, and thus, not only an instantaneous stop is put to further hemorrhage, but, long before the ligature becomes loose, the opposite sides of the vessels have grown together, and all danger of the renewal of the bleeding is over.

The facts, lately established by Dr. Jones, on the subject of hemorrhage, are highly important, in relation to the practice of surgery, and, particularly, to the proper manner of making and applying ligatures. One of the principal circumstances, ably explained by that gentleman, is, that a ligature, when applied round an artery, with a proper degree of tightness, cuts completely through the inner coats of the vessel, and holds them in contact till they have adhered. This ought always to be accomplished in tying an artery: for, it appears from many accurate experiments, which Dr. Jones instituted on animals, that this division of the muscular and membranous coats of a tied artery, has a principal share in bringing on the effusion of coagulating lymph, within the vessel, or, in other words, the process of the adhesive inflammation, by which a permanent closure of the artery is effected. Indeed, the cutting through of the two internal coats of the vessel is so material a thing, that, if a ligature is applied round a large unwounded artery, so as to produce this effect, and then is immediately removed, the adhesive inflammation takes place at the part of the vessel, which was embraced by the ligature, and the canal of the artery becomes permanently obliterated for some extent.

However, if the ligature is not tied with sufficient firmness to cut through the inner coats, the process of adhesion will not, in general, follow.

The knowledge of the great security, which attends the application of the ligature, employed according to the preceding principles, naturally leads us to give a preference to such ligatures, as are made in a manner, not likely to prevent the grand object in view, viz. the division of the internal coats of the tied part of the artery. Dr. Jones thinks, that ligatures should be round, and very firm. There is no danger of their making the external coat of the artery ulcerate, by their tightness, before the internal ones have adhered; for the union of the latter is found to be very soon effected.

Dr. Jones reprobates broad, flat ligatures, because they cannot be tied smoothly round the artery, which must become puckered, and, consequently, have an irregular, bruised wound made in its middle and internal coats. By covering a considerable part of the external surface of the artery, they may also destroy the very vessels, which pass on it, in their way to the cut surfaces of the internal and middle coats, and thereby render them incapable of inflaming. But, says Dr. Jones, admitting that such a ligature makes a proper wound, and that the wound unites, still it may cover that part of the external coat, which is directly over the newly united part, and, consequently, as soon as it has occasioned ulceration through the external coat, it will produce the same effect on the newly united parts, and, of course, secondary hemorrhage.

A ligature of an irregular form will not cut through the inner coats of the artery equally at every point, which Dr. Jones's experiments shew, ought to be done, with a view of occasioning an effusion of lymph, and adhesion.

Dr. Jones has also explained the advantages of applying ligatures in as circular a manner as possible; not higher on one side of the vessel, than the other. Any deviation from a circle must be unfavourable to a steady apposition of the cut surface of the artery, and be conducive to secondary hemorrhage.

Dr. Jones refutes the idea of the impulse of the circulation making the ligature slip off; a fear which has led to very hurtful practices, with a view of mechanically fixing the ligature. Dr. Jones observes, that a candid inquirer into the cause of it will find a much more rational explanation, either from the clumsiness of the ligature, which prevented its lying compactly and securely round the artery; or from its not having been applied tight enough, lest it should cut through the coats of the artery too soon; or from its having that very insecure hold of the artery, which the deviation from the circular application must necessarily occasion.

No other plan of preventing bleeding from large arteries is so secure as the ligature, because no other makes such direct pressure on them, nor acts with such little chance of being displaced. It is in the ligature, that modern surgery has a very material superiority over its ancient state. In the performance of operations, large vessels are often wounded in situations, where the tourniquet cannot be applied. The scientific surgeon now knows, that he can tie such a vessel immediately it is wounded, and then continue his incisions, without that confusion and danger, which would result from a profuse hemorrhage continuing during the whole of his proceedings.

The arteries are either tied together with a portion of the adjacent flesh, or quite separately. Including the flesh is very wrong, as it causes immense pain, and a larger part of the wound to remain disunited. The ligatures are also apt to become loose, as soon as the substance between them and the arteries sloughs, or is absorbed. Sometimes, the ligatures, when thus applied, form a circular furrow in the flesh surrounding the vessels, and remain a tedious time, incapable of being removed. The intervention of any substance, between the ligature and the artery, must also have a greater tendency to prevent the internal coats of the vessel from being cut through; that very event, on which the safety from secondary hemorrhage is found so much to depend.

Blood-vessels partake of the same organization as other parts. Hence the healing of a wounded artery can only take place favourably, when that part of the vessel, which is immediately contiguous to the ligature, continues to receive a due supply of blood through its vasa vasorum. As these vessels are derived from the surrounding ramifications, it is obvious, that the application of a ligature to a divided artery, at some distance from where it is encompassed by flesh, must be very disadvantageous and insecure. Thus, although it is quite improper to include much of the adjacent substance together with the artery in the ligature, it is highly judicious to make the knot as closely as possible to that part of the vessel, which lies undisturbed among its natural connexions. These observations only apply to vessels above a certain size; for, such as shrink from the surface of a wound, are not sufficiently visible to be tied in this manner.

The method of tying an artery is as follows: the extremity of the vessel is first to be taken hold of with a tenaculum, or pair of forceps. The latter instrument is only used, when the vessel is large, and very visible. Then a ligature, that is round, and firm, and, by no means, too thick, is to be put, in the form of a noose, round the artery, just below the end of the instrument. The noose is then to be drawn tight. In order that the noose may not rise above the mouth of the artery, the ligature must be drawn as horizontally as possible, and this is best fulfilled by the thumbs, instead of the fingers. A knot is next to be made.

When the wounded artery is large, one ligature to its upper orifice will not suffice; for, as soon as this is tied, the blood finds its way, through anastomosing branches, into the lower part of the artery, and the lower orifice then begins to bleed.

When a large artery is only punctured, and not completely cut through, the vessel is to be first exposed by an incision, and then have a ligature put under it, by means of an aneurism needle. If the punctured part of the vessel can be conveniently cut down to, the safest plan is to introduce two ligatures under it, and tie one of these above the wound, the other below it. Thus all danger of bleeding, from the blood getting with great freedom into the lower part of the vessel, is effectually removed.

Sometimes, when the punctured part of the artery cannot be prudently exposed by an incision, the surgeon should cut down to the vessel in a situation nearer the heart, and be content with the application of one ligature.

As ligatures act as extraneous substances, and only one-half of each is necessary for withdrawing it, when it is detached, the other is always to be cut off near the knot.

Ligatures usually come away, even from the largest arteries ever tied, in about a fortnight. When they continue attached much beyond the usual period, it is proper to draw them gently every time the wound is dressed, so as to accelerate their separation.

3. COMPRESSION.

This is executed by applying a bandage and compresses in such a manner, that they mechanically stop the effusion of blood.

Formerly surgeons used to fill the cavities of wounds with lint, and then make pressure on the bleeding vessels, by applying a tight roller over the part. The moderns understand too well the utility of not allowing any extraneous substance to intervene between the opposite surfaces of a recent wound, to persist in the above plan, except in a few instances. They know, that the sides of the wound may be brought into contact, and that compression may yet be adopted, so as both to restrain particular hemorrhages, and rather promote, than retard, the union of the wound. When the blood does not issue from any particular vessels, but from numerous small ones, compression is preferable to the ligature. The employment of the latter would render it necessary to tie the whole surface of the wound. In order to make effectual compression in this case, the wound is to have its opposite surfaces brought into contact; compresses are then to be placed over the wound, and a roller is to be applied as tightly as can be done, without hazard of stopping the circulation in the part.

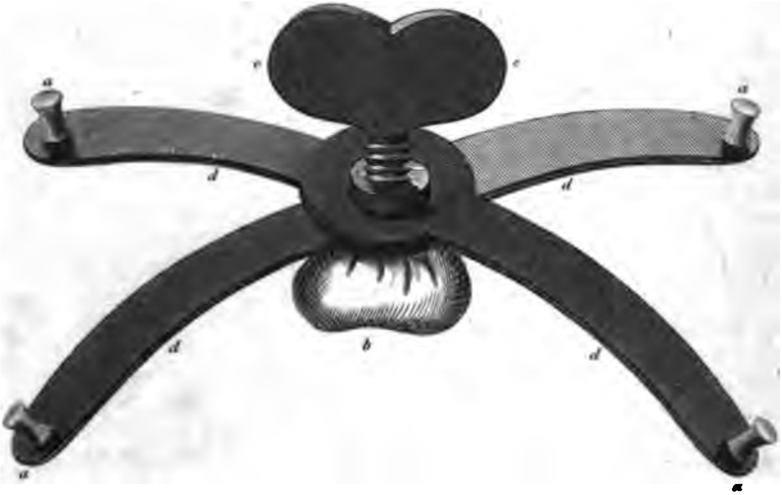
If compression can ever be safely practised in bleedings from large arteries, it is when these vessels run in the vicinity of a bone, against which they can be advantageously compressed. Bleedings from the radial and temporal arteries are of this kind. Compression is sometimes tried, when the brachial artery has been wounded in phlebotomy. Here it is occasionally tried, in preference to the ligature, because the latter cannot be employed without an operation to expose the artery. It is absurd to adopt compression, in this instance, with an idea, that it effects a closure of the wound in the vessel without obliterating its pervious state; and, consequently, that there is less chance of mortification from a deficiency of blood in the limb. Frequent dissections have evinced, that whenever a large artery has been wounded and healed, the wound is never closed, so as to leave the canal of the artery pervious.

It is true, that Dr. Jones's experiments tend to shew, that an artery, very partially divided, may heal, and remain pervious; but, this is not to be expected, when the operation of compression is employed.

When an artery of magnitude has received a small wound, the following plan may be tried.

A tourniquet is to be applied so as to command the flow of blood into the vessel. The edges of the external wound are next to be brought into contact. Then a compress, shaped like a blunt cone, and which is best formed by a series of compresses gradually increasing in size, is to be placed with its apex exactly on the situation of the wound in the artery. This graduated

Plank's Instrument for making pressure on the Artery at the bend of the Arm.



Published April 1 1807, by R. Phillips, Bridge Street, Blackfriars London.

H. Cooper, sculp.

compress, as it is termed, is then to be bound on the part with a roller.

Some surgeons also apply a longitudinal compress over the track of the vessel above the wound; they do so with a view of weakening the current of blood into the vessel. Whatever good effect it may have in this way, is more than counterbalanced by the impediment, which it must create to the circulation in the arm. If the graduated compress be properly arranged, an effusion of blood cannot possibly happen; and the application of pressure, along the course of the artery, must, at best, be deemed superfluous.

After relaxing the tourniquet, if no blood escape from the artery, the surgeon should feel the pulse at the wrist, in order to ascertain, that the compression employed is not so powerful, as entirely to prevent the circulation. The arm is to be kept perfectly quiet in a sling; and in forty-eight hours, if no bleeding take place, there will be great reason to expect that the case will do well.*

Compression of large arteries is never commendable, except in such a case as has been just mentioned, or when the wounded vessel is capable of being firmly compressed against an adjoining bone. The compresses sometimes slip off, or the bandages become slack, so as to give room for fatal hemorrhage. When this plan is employed, the tourniquet should therefore always remain slackly on the limb, and ready to be instantaneously tightened. In this kind of treatment, the external wound may heal, while the aperture in the artery remains unclosed, and an aneurism be the consequence. This particularly occurs when the pressure is not sufficiently potent. When it is too great, mortification of the limb is liable to happen. Such are the objections to compression.

4. AGARIC.

Agaric formerly acquired immense reputation for having the virtue of stopping the most violent hemorrhage, without creating the least irritation. It has, however, no specific property of checking bleeding; and, whatever good effects it may seem to have had, are more properly ascribable to the compression adopted in conjunction with its use. If it has any virtue at all, this is a mechanical one, arising from its soft, spongy texture, which qualifies it for filling up all inequalities in the wound, and thus closing the vessels. When we consider, that agaric is intended to be applied to the mouth of the bleeding vessel; and that, in this plan, the opposite surfaces of the wound cannot be brought into contact, we shall feel inclined to select some other means, not quite so repugnant to the union of the wound. Compression is often tried, because the vessel cannot be tied without having recourse to an operation in order to expose it. But the employment of agaric is warranted by no such reason; for its supposed specific virtues require its application to be made directly to the divided artery. Agaric has also the inconvenience of acting as an extraneous substance in the wound, and, like compresses, it is liable to slip off the precise situation, which it ought to occupy.

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* Plenk has invented an instrument, which is well calculated for healing wounds of the brachial artery by making pressure, without preventing a sufficient circulation in the arm. See Plate I. Leather straps are attached to the buttons, *a, a, a, a,* and are fastened behind the arm by buckles, one above the other below the elbow. The pad *b* is to be placed immediately over a graduated compress, which is to be put directly over the wound in the artery. The necessary degree of pressure may be regulated by the screw *c*; while the branches of the instrument *d, d, d, d,* are at some distance from the limb, and, consequently do not interrupt the flow of blood, either through the arteries, or veins.

When the wounded vessel is large, always prefer the ligature to agaric; when smaller vessels bleed, compression is far preferable to this vainly extolled substance.

These observations on agaric are also applicable to sponge. There are cases, however, in which it is impossible to tie, or compress the bleeding vessel; and improper to employ means, which remain to be described. In bleedings from the rectum, the expanding quality of sponge often renders it exceedingly useful. The following means do not operate on the principle of pressure.

5. ACTUAL CAUTERY.

The application of a heated iron to a bleeding vessel is one of the most ancient modes of suppressing hemorrhage; but, at present, it is almost in general disuse. It operates by producing a slough, which covers and closes the mouth of the artery. In order that it may not injure the circumjacent parts, it is applied through a cannula.

There are several formidable objections to its employment. It does not regularly produce a permanent cessation of hemorrhage, as when the eschar separates prematurely the bleeding recurs. To many patients, the proposal is attended with horror; to all the application is severely painful.

The only cases, in which the actual cautery is at all justifiable in modern practice, are hemorrhages situated in the mouth.

6. POTENTIAL CAUTERY, OR CAUSTICS.

The most common, formerly used, was a button of blue vitriol, of the size of a pea, rolled up in a piece of linen, and placed on the aperture of the bleeding vessel. Its operation is similar to that of heated irons. Caustics are even worse, than the actual cautery; for, their action is more tedious, less effectual, and not confined to the vessel alone. Pelletan has seen inflammation of the dura mater and death produced by applying the muriate of antimony to a bleeding tumour on the head.*

7. STYPTICS.

Styptics are substances, which have the property of producing a contraction of the vessels; and, as some suppose, coagulation of the blood. Such are cold air, cold water, wine, brandy, spirits in general, diluted mineral acids, solutions of alum, blue vitriol, &c. These substances do, indeed, possess the power of stopping some hemorrhages from small vessels; but, they ought never to be trusted, when large arteries are concerned.

The method of applying fluid applications of this kind is to dip lint in them, and place it on the bleeding surface. Compression is generally adopted at the same time.

That cold air has a styptic property, we have the most unequivocal proofs. We frequently tie, on the surface of a wound, every artery, which betrays the least disposition to bleed, as long as the wound continues exposed to the air. We bring the opposite sides of this wound into contact, and put the patient to bed. Not an hour elapses before the renewal of hemorrhage necessitates us to remove the dressings. The wound is again exposed to the air, and again the bleeding ceases. I have often seen this happen in the scrotum, after the removal of the testis. The proper conduct, in such cases, is not to open the wound unnecessarily, but to apply wet linen to the part, so as to produce such evaporation from its surface, as shall create a sufficient degree of cold to stop the bleeding.

No styptic has the property of promoting the coagulation of the blood.

All styptics create irritation on the surface of wounds, and scientific surgeons never apply them to such cases. They are, however, judiciously used to suppress bleedings from many diseased surfaces, where the vessels seem to have lost their natural disposition to contract; and cold styptic injections may be useful in cases, where hemorrhage from the womb continues after the extraction of the placenta.

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* Clinique Chirurgicale, Tom. 2, p. 304.

8. PARTICULAR REMARKS.

When the bleeding vessel is ossified, or situated in a bony canal, a small dossil of lint, introduced into its orifice, will stop the effusion of blood.

When an artery is cut across, and only partly through its diameter, it generally bleeds more profusely, than when quite divided. The reason of this is, because it can neither shrink under the surrounding substance, nor contract itself sufficiently to become impervious. Hence originated the advice to divide some wounded arteries completely through. This plan, however, ought seldom to be practised; for, if the artery is large, a ligature must, after all, be applied both above and below the wound; and though it might answer, when the vessel is of a moderate size, yet, compression is far preferable. Were a large artery to be cut quite through, before applying ligatures to it, the shrinking of the vessel beneath the circumjacent parts would afterwards only increase the difficulty in tying it.

Sympathetic inflammatory fever is the consequence of all considerable wounds. By this, the action of the whole arterial system is rendered more vehement. Hence, during its predominance, the patient is particularly exposed to the danger of fresh hemorrhage. The bleeding, occasioned by the impetuous motion of the blood, arises either from vessels, which previously effused little or no blood, or from such as did bleed before, but were not effectually secured.

In this case, if the patient is very plethoric, the performance of venesection is proper, the loss of venous blood being less prejudicial to the constitution, than that of arterial. The flow of blood into the wounded limb is always to be decreased by placing the part (if possible) in an elevated posture. Sometimes cold applications, in other instances, compression may be advantageously tried. A tourniquet, so constructed as neither to stop the circulation in too great a degree, nor hinder the return of blood through the veins, would be excedingly useful. If the hemorrhage should still continue, the vessels must be exposed, and tied.

Hemorrhages from external injuries seldom require internal means. Were these needed, their virtue is very questionable.

The acetite of lead (cerussa acetata) has been supposed to have some power of this sort; but, few surgeons are so credulous as to place any reliance in it. Keeping the patient in a cool situation, not covered with too many clothes; enjoining him to avoid all motion and exertions; and allowing him only a very low diet; tend to prevent bleeding. All his nourishment and drink should also be cold.

CHAP. XIV.

EXTRACTION OF FOREIGN BODIES FROM WOUNDS; UNION BY THE FIRST INTENTION, &c.

BESIDES hemorrhage, there is another circumstance, to which we must attend, before dressing a wound. This is to remove all extraneous substances from its surface. An incised wound, made with a clean, sharp instrument, can obviously have no foreign bodies in it. But very considerable cuts are often produced by glass, which is apt to break at the moment, and leave some of its fragments in them. As extraneous bodies operate as an irritation to all wounds, and are particularly unfavourable to their speedy union, great attention should be paid to having such things removed as speedily as possible.

The best practical surgeons are universally of opinion, that leaving any blood on the surface of a recent wound, when the two opposite sides of the injury are to be brought into contact, for the purpose of being united, is disadvantageous.

Hunter considered blood, retaining the living principle, as a substance rather useful in the union of wounds, than otherwise; but, blood which had been deprived of this principle by long exposure, the effect of styptics, &c. was regarded by that great man as an extraneous substance. As far as I can learn from the experience of others, and my own observation, leaving blood on the surface of recent wounds generally retards the cure, and renders the union of them more uncertain.

UNION BY THE FIRST INTENTION.

Wounds are healed by two processes: one, in which pus is produced; and another, in which no suppuration takes place. The latter, when practicable, is always the best, because it is not only the most direct means of cure, but, also the most perfect. Surgeons have termed it *union by the first intention.* Its great recommendations are celerity of cure, freedom from the inconveniences of suppuration, and the prevention of an ugly cicatrix.

The strong tendency, which divided parts of the animal body have to grow together, when kept a certain time in contact with each other, is an important fact, of which the moderns have taken much more advantage than the ancients. There are even circumstances on record, in support of the opinion, that it is not entirely impossible for parts, entirely detached from the rest of the body, to become united again, if quickly replaced. The most extraordinary and almost incredible case, in favour of this sentiment, is that mentioned by Garengeot, where a soldier's nose was bit off, yet, on being immediately restored to its natural situation, acquired there a permanent union. The celebrated experiments of Mr. Hunter also merit notice. He proved, that the testicles of a cock, when introduced into the abdomen of a hen, contracted a vascular connexion with the surface of the viscera, and lived. He ascertained, that a sound tooth might be transplanted from its socket, and acquire an union in the alveolary process of another person. Lastly, he cut off the spurs of a young cock, and found that they might be made to unite to its comb, or that of another cock, and grow in such situation. The possibility of this species of union shews, how strong the disposition of the fresh surfaces of a wound must be to grow together; particularly, when it is reflected, that, in the foregoing instances, there can be, on one side, no assistance given to the union, as the separated part is hardly able to do more, than preserve its own living principle, and, (as Hunter expresses himself,) accept of the union.*

In promoting union by the first intention, surgery is merely to officiate as the handmaid of nature. There are only two indications to be fulfilled: the first is to bring the edges of the wound into reciprocal contact, and keep them so; the other is to avert the access of immoderate inflammation, by which the agglutination of the wound would certainly be prevented. The first object is accomplished by a proper position of the wounded part; by bandages; by adhesive plaster, and by sutures. The second is fulfilled by a strict observance of the antiphlogistic regimen; and, particularly, by avoiding every kind of motion and disturbance of the wound. The rest is the work of nature.

1. POSITION OF THE PART.

This is to be regulated on the principle of relaxing the wounded integuments and muscles. If the extensor muscles are injured, the joints which they move, ought to be placed in an extended posture; if the flexor muscles are wounded, the limb is to be bent. When the integuments alone are cut, the same posture, which relaxes the muscles, situated immediately beneath the wound, also serves in general to relax the skin. In transverse wounds of muscular fibres, it is astonishing, what immense effect the observance of a proper posture produces. This is never to be neglected, whatever may be the other means adopted.

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* On the Blood, &c. p. 208.

2. UNITING, OR INCARNATIVE BANDAGE.

This is the name given to such bandages, as support divided parts in exact contiguity. The common uniting bandage can only be applied to wounds, which take a direction corresponding to the length of the body, or limbs, and which are situated where a bandage can be used. It consists of a double-headed roller, having a slit between the two heads. The slit must be sufficiently large to allow one head of the roller to pass through it with facility. The surgeon is to take one head of the roller in each hand, and apply the bandage first to that part of the limb, which is opposite the wound. One head of the roller is then to be brought round, so as to bring the slit precisely over the breach of continuity. The other head is then to be brought round in the opposite direction, and passed through the slit. The bandage is next to be drawn moderately tight, and its two heads being carried round the limb again, the same artifice is to be repeated. A sufficient number of turns of the roller must be made to cover the whole length of the wound.

When the wound is deep, it is recommended to place small longitudinal compresses beneath the roller, at a little distance from the edge of the wound.

As the uniting bandage can only be made use of for longitudinal wounds, which never have a considerable tendency to gape, it is quite wrong ever to apply it exceedingly tight.

The advantages of this bandage are, its having more power than adhesive plaster alone, to maintain the opposite sides of deep wounds in contact; and its acting without the irritation, frequently arising from the application of resinous substances to the skin.

It is not, however, exempt from inconveniences. Its total concealment of the wound; its lying in irregular folds, so as to create an uneven cicatrix, &c. might be mentioned.

3. ADHESIVE PLASTER.

This has been absurdly termed the *dry suture*, to distinguish it from sutures, which are attended with bleeding; and it is erroneously set down in numerous surgical books, as being only applicable to superficial wounds of the skin. It is true, that adhesive plaster has no direct effect of bringing together the edges of a deep, muscular wound; but, let it be remembered, that, while it proves effectual in maintaining the edges of the skin in contact, it presents no obstacle to the adoption, at the same time, of a proper position, compresses, and bandages, which are means having more effect on the deeper part of the wound. It is also an error to suppose, that adhesive plaster cannot be used in situations, where hair grows, or where the application is apt to become moistened. If the part be well shaved, and perfectly dried at first, the plaster will not become loose so soon as to prove ineffectual.

It is generally applied in strips, between every two of which an interspace is recommended to be left, for the purpose of allowing discharge to escape. To bring the edges of the wound effectually together, and, at the same time, to leave a little room for the exit of the discharge, are the objects, to which we ought to attend in using adhesive plaster. Hence, when the strips are broad, it is not unfrequent to cut out an oval piece of each strip, just where it crosses the wound.

Equal parts of the empl. litharg. and empl. litharg. c. resina, form the composition commonly used in this country.

4. SUTURES.

Of the numerous kinds of sutures, practised by the old surgeons, there are now only four ever employed. These are the *interrupted*, the *quilled*, and the *twisted* sutures, with another one named *gastroraphe*. The twisted suture will be spoken of in the chapter on the harelip, and gastroraphe will be noticed in that on wounds of the abdomen.

INTERRUPTED SUTURE.

The curvature of the needle employed should form a segment of a regular circle. When the needle is so shaped, as to be curved towards its point, and straight towards its eye, it is obvious, that it is not advantageously constructed for passing through parts with facility. It should be double-edged for one-third of its length from the point, and its broadest part should be somewhat broader, than the ligature, in order that the latter may traverse the wound with the utmost ease.

When the bleeding has been suppressed, and all extraneous substances have been removed, the surgeon is to place the limb in such a posture, as shall enable him to bring the lips of the wound easily into contact. The needle, armed with a ligature, is then to be introduced into the right lip of the wound, at a small distance from its edge, and is to be directed across the bottom of the wound, so as to come through the left lip from within outward. The needle is now to be cut off, and the ligature tied in a bow. These sutures should always be, at least, an inch from each other. Strips of adhesive plaster, and a bandage, are, at the same time, usually employed.

QUILLED SUTURE.

So called from a quill being formerly used in making it. This means of uniting wounds has been occasionally practised, when the muscles have been deeply wounded, and it was employed on the supposition, that it produces a more perfect support of every part of a wound, than is effected by the preceding suture. The same kind of needle is used as for the interrupted suture: but, it must be armed with a double ligature. When the double ligatures have been introduced through the lips of the wound, at as many places as the length of the wound may require, their ends are to be separated, and then tied in a bow over a piece of bougie, quill, or any similar thing, placed along each lip of the wound.

Dionis first reprobated the adoption of this suture, and it is justly rejected by almost all the moderns, so that it is unnecessary to consider any of its modifications.

SUTURES NOT GENERALLY PROPER.

In the present schools of surgery, the use of sutures is not recommended as it was in former days. It is now known, that, by the combined operation of position, adhesive plaster, and a bandage, almost all wounds are capable of being united, as expeditiously, and well, as they could be, were sutures to be employed. Therefore, were it only to avoid superfluous pain, we ought to reprobate the practice in general. Did sutures only create a little additional pain, and no other evil, still their employment would be justifiable, if they really possessed the power of rendering union by the first intention, a matter of greater certainty, in only a limited proportion of cases, to which they are applied. In the cure of the harelip, and a few wounds of the face, and, perhaps, in the treatment of large wounds, penetrating the abdomen, we must admit their utility. In wounds of the lips, the incessant and unavoidable motion of the part; and, in those of the abdomen, the distention, arising from the viscera, and the danger of their being protruded, are reasons, which explain the advantage of sutures in these particular instances. But, in general, the promotion of union by the first intention cannot be set forth as a valid argument, in favour of sutures being commonly used. Inflammation, above a very moderate pitch, always destroys every prospect of this nature, and occasions the secretion of pus, instead of the exudation of coagulating lymph. Sutures have fallen into disrepute, principally, because they tend to increase inflammation. The new wounds, which they make, their irritation as extraneous bodies, the forcible manner in which they drag the living parts together, and their incapacity, in general, to accomplish any useful purpose, which position, adhesive plaster, and bandages, cannot effect, are strong motives for reprobating their being commonly used. In fact, it often happens, when sutures are employed, that considerable inflammation of the wound is the consequence, and its swollen edges evince marks of suppuration, unless soon relieved from the irritation of the ligatures. In this case, if the surgeon is sagacious enough to cut the ligatures, and remove them in time, suppuration may still be frequently avoided. Extensive erysipelatous redness, surrounding wounds, will often be found to originate from the irritation of sutures.

M. Pibrac's remarks, on this subject, are highly worthy of universal consideration. After relating many convincing facts, he concludes with asking, what practice the partizans of sutures would adopt, were they necessitated, as they frequently are, to cut the ligatures, and remove them? Or, were they to find, as is often the case, that the ligatures had made their way through the lips of the wound, so as to leave them gaping? They would then never think of introducing new sutures, but would have recourse to a bandage, in order to unite the wound.*

They, who assert, that the good effect of sutures is, in many cases, supported upon the solid basis of experience, ought to prove, that the same effect could not be produced by the combined operation of a proper posture, adhesive plaster, and the pressure of bandages.

Whoever wishes to investigate this subject further should peruse M. Louis's observations on the first principle of the art of uniting wounds. This justly famous man proved, that even the harelip could be united very well without a suture.†

CHAP. XV.

PROCESS BY WHICH THE WOUND IS UNITED.

WHEN the opposite sides of an incised wound are maintained in contact by the foregoing means, they soon become permanently connected together. The vessels of the wounded surface cease bleeding, and their extremities become impervious to the blood itself, but not to the coagulating lymph, which forms the general bond of union between living parts. This uniting medium is the primitive and most simple connexion; that takes place between the two sides of a wound. In many cases, however, where the wound is put into a state of apposition, before the hemorrhage has had time to cease, no doubt a coagulum of blood itself constitutes the first bond of union, and, wounds must thus be frequently united through the medium of red blood. I have, however, already explained, that the best practical surgeons prefer the plan of making the surface of the wound as free from blood as possible, before bringing the opposite sides of the injury into contact. It is found, that union by the first intention will more certainly follow this mode of proceeding. However, the reader is not to understand, that he is to defer bringing the sides of a wound together, until every little oozing of blood is at an end. The long exposure of the wounded surface would be very injurious and tend to defeat the grand object in view, direct adhesion, without suppuration.

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* Sur l'Abus des Sutures, in Mém. de l'Acad. de Chirurgie, Tom. 3, 4to, or Tom. 9, 12mo.

† See Mémoire sur l'Opération du Bec-de-Lievre, op. cit. Tom. 12. p. 118. edit. 12mo.

The simple agglutination of the sides of a wound together, is what may be considered as taking place directly they have been brought into contact. The next step, in the process of union by the first intention, is the generation of vessels in the coagulating lymph, or blood, and this is soon followed by an intercourse between the vessels of the two sides of the wound. The manner, in which the new vessels arise in the uniting medium, as well as the way, in which the inosculation of the divided vessels happens, are at present only matters of conjecture. Mr. Hunter conceived that blood and coagulating lymph, as long as they retained the living principle, possessed the faculty of generating vessels within themselves, quite independently of any adjoining surfaces. In the growth of the chick, there are some appearances in favour of this opinion.

The celerity, with which the process of union by the first intention is completed, is a circumstance that must excite the admiration of the philosophical surgeon. In the short space of seventy-two hours, the wound, produced by an amputation of the thigh, is often securely united through its whole extent, without any suppuration, except just where the ligatures are situated. Incised wounds, of a moderate size, may in general be completely healed by this method in forty-eight hours. How different then is the surgery of the present day to that of half a century ago, when the bigoted prejudices of our ancestors deterred them from doing, not only what was most salutary, but most simple! The complicated business of accomplishing digestion, incarnation, and cicatrization, is now reduced to the easy duty of bringing the edges of a clean cut wound into contact, and maintaining them so, until they have grown together.

CHAP. XVI.

PUNCTURED WOUNDS.

PUNCTURED wounds are not only dangerous, on account of their frequently extending to a considerable depth, and injuring important blood-vessels, nerves, and viscera, they are also dangerous inasmuch as they frequently give rise to very extensive inflammation. It is not uncommon to see formidable collections of matter follow wounds of this description, especially, when the instrument with which they have been made, has penetrated any aponeurosis, or fascia. Stabs, and all other punctures, are not simple divisions of the fibres of the body, they are attended with more or less contusion and laceration. Hence, there is not the same readiness to unite, which we observe in wounds made with sharp cutting instruments, and, when ligamentous expansions are among the objects of injury, both the structure of the wounded parts, and the nature of the wound itself, often produce a train of severe local and constitutional symptoms. When an artery of consequence is punctured, the hemorrhage must be suppressed, either by exposing the vessel and tying it, or by applying graduated compresses and a bandage. The choice of these means must be determined by considerations, already hinted at in a preceding chapter. Immense agitation of the nervous system very often follows the infliction of a punctured wound, and this has been attributed to the injury of tendons, or nerves. This doctrine is now almost quite exploded, as surgeons so frequently see nerves and tendons wounded, without the occurrence of great constitutional disorder, in five cases out of a hundred. The explanation of the fact, that great derangement of the system is very apt to follow punctured wounds, is not yet unfolded in a satisfactory manner; but, the fact itself is fully established by the surgical records of all ages, and on the firm basis of daily experience.

Punctured wounds are frequently very difficult and tardy of cure, on account of their being attended with the formation of deeply-seated abcesses and sinuses. The narrowness of their orifices also renders the extraction of any extraneous bodies by no means easy of accomplishment.

TREATMENT OF PUNCTURED WOUNDS.

In this part of practice, erroneous suppositions have very commonly led to very serious abuses. The unlimited idea, that the severe consequences of most punctured wounds are in a great measure owing to the narrowness of their orifices, induced numerous surgeons to practise, indiscriminately, deep and extensive incisions, for the purpose of rendering their external communication considerably wider. To have constantly in view the conversion of such injuries into simple incised wounds, was always a maxim, strongly insisted upon, and set forth as the reason of the above method of treatment. The doctrine even occasioned the frequent dilatation of punctured wounds by the still more absurd and cruel employment of tents.

Certainly, if the notion were true, that an important punctured wound, such as the stab of a bayonet, is actually changed into a wound, partaking of the mild nature of an incision, by the mere enlargement of its orifice, the corresponding practice would be highly commendable, however painful it might be. But the fact is otherwise; the rough violence done to the fibres of the body by the generality of stabs, is little likely to be suddenly removed by an enlargement of the wound. Nor can the distance, to which a punctured wound frequently penetrates, and the number and nature of the parts injured by it, be at all altered by such a proceeding. These, which are the grand causes of the collections of matter, which often take place in the cases under consideration, must exist, whether the mouth and canal of the wound be enlarged or not. The time, when incisions are proper, is when there are foreign bodies to be removed, abscesses to be opened, or sinuses to be divided. To make painful incisions sooner, than they can answer any end, is both injudicious and hurtful. They are sometimes rendered quite unnecessary by the union of the wound throughout its whole extent, without the least suppuration.

It is true, that making a free incision, in the early stage of these cases, seems a reasonable method of preventing the formation of sinuses, by preventing the confinement of matter, and, were sinuses an inevitable consequence of all punctured wounds, for which no incisions had been practised at the moment of their occurrence, it would undoubtedly be unpardonable to omit them. To many this may seem a very specious, and fair pretext for making a free incision to enlarge a punctured wound. Fair, however, as it may appear, it is only superficially plausible, and a small degree of reflection soon discovers its want of real solidity. Under what circumstances do sinuses form? Do they not form only where there is some cause existing to prevent the healing of an abscess? This cause may either be the indirect way, in which the abscess communicates externally, so that the pus does not readily escape; or it may be the presence of some foreign body, or carious bone; or lastly, it may be an indisposition of the inner surface of the abscess to form granulations, arising from its long duration, but removable by laying the cyst completely open to the influence of the air. Thus it becomes manifest, that the occurrence of suppuration in punctured wounds is only followed by sinuses when the surgeon neglects to procure a free issue for the matter after its accumulation, or when he neglects to remove any extraneous bodies. But, as dilating the wound, at first, can only tend to augment the inflammation, and render the suppuration more extensive, it ought never to be practised in these cases, except for the direct objects, of giving free exit to matter already collected, and of being able to remove extraneous bodies palpably lodged. I shall once more repeat, that it is an erroneous idea, to suppose the narrowness of punctured wounds so principal a cause of the bad symptoms, with which they are often attended, that the treatment ought invariably to aim at its removal.

Recent punctured wounds have absurdly had the same plan of treatment applied to them as old and callous fistulæ. Setons and stimulating injections, which in the latter cases sometimes act benefically by exciting such inflammation, as is productive of the effusion of coagulating lymph, and of the granulating process, can never prove serviceable when the indication is to moderate an inflammation, which is too apt to rise to an improper height. The counter-opening, which must be formed, in adopting the use of a seton, is also an objection; and though French authors have given us accounts of their having drawn their setons across patients' chests, in cases of stabs, they would find some difficulty in making the practice seem unattended with harm, much less productive of good. The candid, and judicious surgical reader should not always think a plan of treatment right, because the patient gets well; for, there is an essential difference between a cure, promoted by really useful means, and an escape, notwithstanding the employment of hurtful ones.

Why, however, should we mention the use of a seton? What good can possibly arise from it? Will it promote the discharge of foreign bodies if any are present? By occupying the external openings of the wound, will it not be more likely to prevent it? In fact, will it not itself act with all the inconveniences, and irritation, of an extraneous substance in the wound? Is it a likely means of diminishing the immoderate pain, swelling, and extensive suppuration, so often attending punctured wounds? It will undoubtedly prevent the external openings from healing too soon; but cannot this object be effected in a better way? If the surgeon observes to insinuate a piece of lint into the sinus, and pass a probe through its track once a day, the danger of its closing too soon will be removed.

The practice of enlarging punctured wounds by incisions, and of introducing setons, is often forbidden by the particular situation of these injuries.

In the first stage of a punctured wound, the indication is to guard against the attack of violent inflammation. When no considerable quantity of blood has been lost, general and topical bleeding should be practised. In short, the antiphlogistic plan is to be followed. As no man can pronounce, whether such wounds will unite, or not, and as no harm can result from the attempt, the orifice ought to be closed with strips of adhesive plaster, and gentle compression applied along the whole course of the puncture. Perfect quietude is to be observed. When the pain is very severe, opium is to be administered.

Sometimes, under this treatment, the surgeon is agreeably surprised to find the consequent inflammation mild, and the wound speedily united by the first intention. More frequently, however, in cases of deep stabs, the pain is intolerable; and the inflammatory symptoms run so high, as to leave no hope of avoiding suppuration. In this condition, an emollient poultice is the best local application: and, when the matter is formed, the treatment must conform to the principles already noticed in the chapter on suppuration.

CHAP. XVII.

OF LACERATED AND CONTUSED WOUNDS.

A *lacerated wound* is one produced by a force, which overcomes the attraction of cohesion among the fibres of the body, by violently tearing the parts asunder. The edges of this kind of wound are irregular and jagged.

A *contused wound* is occasioned by the collision of a blunt instrument against some part of the body.

Both these sorts of wounds are much more perilous, than incised ones. Wounds, made with sharp instruments, are frequently attended with vast retraction of the divided parts, and profuse hemorrhage; but it is known, at the same time, that they are generally capable of being united by the first intention. It is almost a constant effect of lacerated and contused wounds to pour forth very little blood, even when important blood-vessels have been injured. Whole limbs have been torn from the body, without the occurrence of bleeding. The experienced practitioner is not deceived by the absence of this symptom; for, he knows that in proportion as the bleeding from large contused and lacerated wounds is trivial, the violence applied to the injured parts has been great.

TREATMENT OF CONTUSED AND LACERATED WOUNDS.

In these wounds, we do not find the same disposition to unite, which is observed in simple incisions. They are not mere breaches of continuity, but injuries attended with the application of such violence to the divided fibres, that suppuration, and even sloughing of some part of the wounded surface, are generally the consequences. From severe contused and lacerated wounds a rapid mortification often arises, which extends itself over a whole limb, and frequently occasions death.

The inflammation, attending lacerated and contused wounds, seldom restricts itself to those moderate bounds, in which alone the process of adhesion can take place. Thus the advantageous prospect of union by the first intention disappears, and we are left to promote a more circuitous plan of cure, instituted by nature.

The first indication is to remove extraneous bodies, the irritation of which always aggravates the local mischief; and, in these wounds, extraneous bodies are much more frequently present, than in wounds, made with clean sharp instruments. As the inflammation, which follows, is likely to be violent, it is proper to promote any moderate effusion of blood from the wound, and, in bad cases, even to employ the lancet.

Though we cannot expect, that any considerable extent of contused and lacerated wounds will heal by the first intention, yet, we know, that it is advantageous to approximate their lips, just as we do those of incised wounds. When a wound is left gaping, there is not only a larger cavity for nature to fill up, but no opportunity is afforded to any part of the wound, which may be disposed to unite at once, to do so. For it is to be observed, that different parts of wounds of this description are injured, by different degrees of violence. In some places, the violence may not totally prevent the effusion of coagulating lymph; in some, it may render suppuration inevitable; while in others, which have been most forcibly injured, sloughing may happen.

I am not intending to inculcate, that contused and lacerated wounds are to be put in a state of apposition with the same exactness as incised ones. Their jagged and irregular edges would render it impracticable; and, were it possible, the confined and compressed state necessary to maintain these edges perpetually in contact, would greatly aggravate the unavoidable ill effects of the ensuing inflammation. It is only meant to represent the propriety of not leaving many wounds with their edges very distant asunder; and to recommend the practice of applying, here and there, a strip of adhesive plaster, in order that their cavities may not be so extensive and exposed. Until the edges and surface of these wounds assume a clean appearance, no application is so proper as an emollient poultice. When all the sloughs have separated, and the secretion of healthy pus has commenced, dry lint, together with a pledget of simple ointment, is all that is requisite.

CHAP. XVIII.

OF GRANULATIONS AND CICATRIZATION.

Granulations are formed by an exudation of the coagulating lymph from the vessels of the wounded or exposed surface. Into this substance, it is probable, both the old vessels extend, and in it new ones are formed, so that granulations become highly vascular. The vessels of granulations pass from the original parts beneath to their bases, and thence towards their external surface, in almost parallel lines.

Granulations have the same disposition to secrete pus, as the surface, from which they were produced.

The surfaces of granulations are very convex, having a great many points, or small eminences, so as to appear rough. The smaller these points are, the more healthy we find the granulations. The colour of healthy granulations is a deep florid red. When of a livid colour, they are commonly unhealthy; and such an appearance denotes, that the circulation of the blood in them is languid. Position produces this livid hue, by retarding the return of blood. This is the reason, why some sore legs are so backward in healing, when the patients are allowed to stand and walk.

Granulations, when healthy, and situated on an exposed, or flat surface, rise nearly to the level of the surrounding skin, and often a little higher; but, when they exceed this, and assume a growing disposition, they are unhealthy, becoming soft and spongy, and losing the power of producing new skin.

Healthy granulations are always prone to join with each other, and their vessels soon begin to inosculate.

Granulations do not possess the powers of the original parts of the body; and consequently, are very subject to mortify, or be absorbed.

These new substances must be supplied with nerves and lymphatics; how tender they frequently are every one knows; and it is equally well known, that medicines, applied to the surface of ulcers, sometimes find their way into the circulation, by means of absorption.

Granulations partake of the same qualities, whether they grow from the surface of a bone, or of the soft parts.

It is, by the foregoing process, that nature fills up the hollows of deep wounds which cannot have their edges brought into contact, and it is, by the same steps, that she succeeds in filling up the cavities of abscesses. The work, however, is not quite reducible to this simplicity. All modern practitioners observe, that as soon as the formation of granulations commences, the diameter of the wound becomes diminished from every two points of its circumference, even before any new skin appears to be formed. The natural elasticity of the skin, and the contraction of muscles, satisfactorily account for the separation of the edges of a wound. But, how these edges become approximated, during the granulating process, is not so well understood. It has been said, that it arises from the diminution of the swelling, which surrounds the wound. This is by no means a satisfactory explanation, because we know, that the separation of the edges proceeds from a different cause, and takes place prior to the swelling, and immediately on the occurrence of the wound. Mr. Hunter attributed the beneficial effect to a contraction of the granulations. He says: "The contraction takes "place in every point, but, principally, from edge to edge, "which brings the circumference of the sore towards the "centre, so that the sore becomes smaller and smaller, although "there is little or no new skin formed." This contraction of granulations takes place in a greater degree, and has a greater effect, when there is a looseness of the parts, on which they are formed. When they are formed on parts naturally fixed, as the skull, shin, &c. the contraction is impeded.

This contraction of granulations is not confined to open wounds; it takes place in the cavities of abscesses, which by this means contract like the urinary bladder, till little, or no cavity is left. When the granulations cannot contract further, if any cavity be remaining, it is obliterated by the opposite granulations growing into each other.

Besides the contractile power of the granulations, there is also a similar power in the surrounding edge of the cicatrizing skin.

As the granulations contract, the integuments become extended over the part, which had been deprived of skin. Mr. Hunter thought this elongation of the old skin not the mechanical effect of its being stretched, but the consequence of what he would term *interstitial growth*.

The contraction of granulations appears one of the most beautiful examples, for illustrating the wisdom, with which the natural principles of our body have been established. By it, the formation of much new skin is rendered unnecessary; a great advantage, as parts originally formed are much fitter for the purposes of life, than those which are newly formed. By it, wounds which, from chirurgical neglect, have lost the opportunity of uniting by the adhesive inflammation, and others, which must necessarily heal in a more circuitous manner, are ultimately brought almost into the same state, as if they had been united by the first intention. The cicatrix, compared with the original breadth of the wound, is, by this beneficial process, often made as one to three.

After the whole wound is covered with skin, the remains of the granulations, beneath it, still continue to contract, till hardly any thing more is left, than what the new skin stands upon. This is a very small part, in comparison with the first formed granulations; and, in time, it loses more of its apparent vessels, and becomes white, and like ligament.

OF THE GROWTH OF NEW SKIN OVER GRANULATIONS.

When a wound begins to heal by the granulating process, the surrounding old skin, near the granulations, no longer exhibits the glossy redness, about one-fourth, or one-half of an inch in breadth, which it previously shewed. The angular margin of the skin becomes converted into a roundish, smooth, and white boundary; and the nearer to the cicatrizing edge, the whiter it is. This white substance Mr. Hunter suspected to be a beginning cuticle.

Skin is a very different substance, with respect to texture, from the granulations, upon which it is formed. Whether it is a new matter, deposited on the granulations, and produced by them, or only the surface of the granulations themselves changed, is not easily determined.

The new skin most commonly takes its rise from the adjacent old skin, as if elongated from it; but, this is not regularly the case. I remember a man, who was dreadfully burnt over the greater part of his body, in consequence of which he had extensive sores, occupying nearly the whole surface of some of his limbs. When these ulcers had considerably diminished, the power of producing skin seemed to lessen at the edges, but, at the same time, new portions of skin made their appearance at various parts of these ulcers, standing (as Mr. Hunter ingeniously describes) upon the surface of the granulations, like little islands. Mr. Hunter was of opinion, that this production of skin, in the centre of sores, never happened the first time of their being sores. In the patient just mentioned, whom I saw in Mr. Ramsden's private practice, and attended a long while, the contrary fact took place.

In general, the surrounding skin seems to communicate a disposition to the surfaces of the adjoining granulations to form skin; just as bones give an ossifying disposition to granulations formed upon them.

The new formed cutis is neither so yielding nor so elastic, as the original. It is also less moveable, and destitute of the furrows, observable on the old skin. At first, it is extremely full of vessels; but, afterwards, both it and the granulations, beneath, become free from visible vessels, and therefore white. The surrounding old skin is puckered into loose folds, while the new constantly retains a stretched, shining appearance.

The production of cuticle, from the new cutis, is a much more easy process, than the generation of skin. The formation of skin is chiefly progressive from the surrounding cutis; but, the cuticle is frequently formed at once, equally from every point of the cutis.

The rete mucosum is not so readily formed as the cuticle; for, in blacks a cicatrix remains whitish a considerable time, and sometimes even throughout life.

CHAP. XIX.

GUNSHOT WOUNDS

ARE produced by hard, obtuse, generally metallic substances, projected from some species of fire-arms, and violently impelled into a part of the body.

The differences of gunshot wounds are referrible to three principal causes. 1. The kind of body projected. 2. The velocity of the body. 3. The nature and peculiarities of the parts injured.

1. KIND OF BODY PROJECTED, &c.

Former surgeons, seeing the terrible mischief frequently arising from gunshot wounds, entertained a suspicion, that the injured parts were either dreadfully burnt by the heat of the projected body, or were irritated by the presence of poison, as well as by mechanical violence. The moderns, better acquainted with the laws of projectiles, and the component ingredients of gunpowder, rightly attribute the ill consequences of gunshot wounds to the violence, contusion, and laceration, inflicted on the wounded parts. Reason and experience prove, that a ball, however great the rapidity of its motion, never acquires in its course any perceptible degree of heat; and that there is nothing poisonous in the composition of gunpowder is now universally known. The violence being produced in general by so obtuse a body as a musket ball, and often done with immense velocity, is generally productive of sloughing and a high degree of inflammation. Bullets are the most common bodies shot into the injured parts; but, the wound may be produced by cannon balls, pieces of broken shells, and, very often on board of ship, by splinters of wood. Large bodies of irregular figure, it is obvious, must occasion a greater quantity of mischief, than such as are externally smooth, of a round form, and of moderate size. Pieces of clothes are often carried along with the ball into the wound.

But, gunshot wounds, by what bodies soever produced, are always attended with contusion and laceration, by which, most commonly, some of the fibres, immediately surrounding the wound are deadened, and must be thrown off, in the form of a slough, before the wound can heal. Hence, gunshot wounds rarely admit of being united by the adhesive inflammation; and, on this same account, they seldom bleed profusely, except when very considerable blood vessels are wounded.

2. VELOCITY OF THE PROJECTED BODY, &c.

Besides the figure and magnitude of the body impelled into the living solids, the velocity with which it moves, has considerable influence. This we are assured of by finding, that, when a ball has passed with little velocity (which is often the case with balls at their entrance, but most commonly where they are near their exit,) the wounds may often be healed by the first intention. At the entrance of the ball, the circumference is usually depressed; at its exit, prominent; and in numerous instances, the adjacent parts have a livid appearance. The opening, which the ball makes in entering a limb, is always smaller than that by which it passes out again.

On account of the parts surrounding a gunshot wound being often deadened, the nature of the injury cannot always at first be comprehended. A part of some viscus, some large artery, or even a bone, may have been deadened by the violence; but, the mischief does not manifest itself, till the separation of the slough takes place.

The detachment of the deadened parts is usually not accomplished, till about six, eight, or ten days, after the receipt of the injury, and consequently, at these periods, there is the greatest danger of hemorrhage, extravasations of the contents of viscera, &c.

When the ball moves with little velocity, there is always less sloughing than when it has penetrated with rapidity. When the divided parts have not time to yield to the dividing body, they must of course suffer a vast deal more violence.

If the velocity of the ball is great, the direction of the wound is more likely to be straight.

3. NATURE AND PECULIARITIES OF THE PARTS INJURED.

When a gunshot wound only injures soft parts of ordinary importance, it is termed *simple*.

When, at the same time, it fractures a bone, wounds a large artery, nerve, or important viscus, it is then called *compound*.

The latter complications must greatly increase the danger of the accident, as any one may readily conceive, who knows the peril attending fractures, conjoined with a wound; the hazard of bleeding, or of mortification, when the main artery of a limb is injured; and the various consequences of wounds of the viscera, extravasations, &c.

OF CIRCUMSTANCES INFLUENCING THE COURSE OF BALLS.

The form, the momentum, and the direction of the shot, which is received; the position, and the variety of structure, or, in other words, the variety of density, and powers of resistance, in the part receiving it; are the principal causes influencing the course of the ball, in its passage through the substance of the body.

Every new resistance, which a shot in motion meets with, operates so as to produce, not only a diminution of its momentum, but, also, a change in its direction.

By adverting to the above circumstances, the strange course which some balls take, running nearly all round the body beneath the skin, is satisfactorily accounted for.

A ball has been known to pierce the integuments, at the malleolus internus, and, after gliding between the skin and the tibia, ascend and make its exit near the knee. A ball, in this manner, may enter at the forehead, and come out at the temple.

OF GUNSHOT CONTUSIONS WITHOUT ANY EXTERNAL BREACH OF CONTINUITY.

It has been a prevailing idea, that a ball may injure parts of the body in two ways, viz. by actually striking them, and by passing close to them, without touching them at all. This last injury has been supposed to originate from the violent commotion produced in the air by the rapidity of the ball. It generally consists of a considerable bruising, and even comminution, of the soft and hard parts situated beneath the skin, which remains itself entire.

The above mode of explaining how this violence is occasioned, is too absurd to need a serious refutation. The slight perturbation of the air is too feeble to account for the degree of violence committed. The air, to which the ball must impart the greatest motion, is that which is directly before it; and yet this does not do the smallest degree of violence to the parts surrounding the spot at which the ball enters. Cannon balls often strike limbs, without the neighbouring parts being in the least hurt.

Our soldiers and seamen frequently have pieces of their hats, feathers, clothes, and even of their hair, shot away, without any other mischief whatever being produced.

There is as little foundation for attributing the injury to electricity, produced by the violent friction of the ball in the bore of the gun, and said to be communicated to the injured part; for, metals do not become electric from friction.

There can be no rational doubt, that the injury is caused immediately by the ball itself. Its occasioning a violent contusion, without wounding the skin, or entering the limb, is to be ascribed to the sloping direction, in which it first strikes the surface, and to its being reflected.

In some instances, this kind of mischief may be caused by spent balls, which, having lost nearly all the impetus originally imparted to them, operate chiefly by their weight. The injury, occasioned by these gunshot contusions, is often excessively severe, notwithstanding the skin may seem entire. The soft parts underneath are sometimes quite crushed and destroyed, the bones fractured, and that kind of stupor of the whole member occasioned, which inevitably ends in mortification.

Surgeons ought to feel themselves under great obligation to Ambrose Paré, for the more accurate opinions which he introduced into this part of the subject. It was he that first corrected several erroneous suppositions, respecting gunshot contusions, and paved the way to a better theory.

KINDS OF EXTRANEOUS BODIES USUALLY LODGED IN GUNSHOT WOUNDS.

Extraneous bodies are more frequently met with in gunshot wounds, than in any others. They are commonly of three sorts: 1. Pieces of clothes, or other substances, which the ball has driven into the limb: 2. the ball itself: 3. or lastly, loose, splintered portions of bone.

Such foreign bodies are the causes of many bad symptoms. They irritate the wounded parts so as to excite pain, inflammation, a disposition to hemorrhage, copious, and long-continued suppuration, &c. The more uneven, pointed, and hard, such foreign bodies are, the more they are apt to create these unpleasant occurrences.

When there is only one opening, the surgeon has a right to conclude, that the ball is lodged; for, I need scarcely lay down as exceptions to this observation, the very rare cases, in which the ball, after making a deep wound, is found in the patient's shirt. In these instances, the foreign body carries a piece of shirt with it into the part, without going through the linen, and, when the latter is inadvertently drawn out, the ball is also extracted.

When there are two apertures, we may infer, that the ball has passed out. However, pieces of the clothes may still be lodged in the wound; for, as they are lighter, and move with less impetus than the shot itself, they must be more likely to be left behind.

EFFECTS OF THE SHOCK OF SOME GUNSHOT WOUNDS ON THE NEIGHBOURING PARTS, AND THE WHOLE MACHINE.

When a ball strikes a bone, a degree of concussion is necessarily occasioned. If trivial, its effect is limited to the seat of injury. Sometimes the shock extends to the nearest articulation, where it occasionally produces inflammation and suppuration.

When a cannon-ball tears off a whole limb, it may cause a violent concussion of the whole body, and, at the same time, an alarming perturbation of all the animal functions.

Instantaneous loss of all the senses, swooning, and incapacity to move, are said to be the ordinary effects immediately produced on the system, by so violent a species of injury. Authors are even inclined not to limit the consequence of the shock to what I have stated; but, mention inflammation and suppuration of the liver, lungs, &c. as sometimes ensuing from it.

There certainly are some very curious facts, concerning the latter point, which are recorded in the Mémoires de l'Academie de Chirurgie; but, which can only be received as inexplicable truths.

The injured part is represented as being, in many instances, affected with a remarkable degree of heaviness and numbness, which alarmingly portend a tendency to gangrene. Such torpor and insensibility, when they affect the whole body after a gunshot wound, are deemed omens of the most fatal kind, more especially, if a large shot has struck a bone, and caused a violent concussion.

M. Quesnay mentions a light horseman, who died in this state, and whose torpor and indifference were such, that, when the proposal to amputate his leg was made, he replied, "Que "ce n' étoit pas son affaire."

The sudden yellowness, shiverings, syncope, and other nervous affections, with which patients are sometimes seized, on the receipt of a gunshot wound, afforded to the old practitioner another ground for suspecting, that the gunpowder conveyed something deleterious into the part.

With regarded to the loss of senses, &c. said to be immediately produced when a cannon-ball tears off a limb, I have ascertained, that, such disorder is, at least, not always excited. A young sailor, some time ago presented himself at St. Bartholomew's Hospital, who had had his arm carried away at the shoulder, by a cannon-shot, which at the same time broke his scapula into numerous splinters: notwithstanding this terrible injury, his senses remained quite perfect.

TREATMENT OF GUNSHOT WOUNDS.

The first thing, in the treatment of a gunshot wound in one of the extremities, is to determine, whether it is more advisable to amputate the wounded limb immediately, or to undertake the cure of the wound.

When a bone, especially, at a joint, is shattered into numerous fragments; when the soft parts are, at the same time, extensively contused and lacerated, with injury of important blood-vessels and nerves; and when at the same time the whole limb is thrown into a cold and insensible condition by the violence of the shock; no resource is so safe as amputation; and delay, under such circumstances, would lead to almost certain death.

But, below this violent pitch of injury, in which the necessity of amputation is visible to every eye, there are several inferior degrees, in which the soundest judgment is required to form a prudent determination.

In many of these cases, the scale is so delicately balanced, that an opinion is not to be formed from a consideration of the injury alone. The patient's constitution; the possibility, or impossibility, of procuring good accommodation, rest, attendance, and pure air, are matters, which ought to have immense weight in dubious cases.

Bilguer, surgeon-general to the armies of Frederick the Great, King of Prussia, published an essay, in which the practice of amputation was condemned as an operation hardly ever proper.* The arguments, broached in this extraordinary production, however great their influence might once be, as coming from so high an authority, can no longer misguide any practitioner of common sense. In France, the absurdities of Bilguer's work were ably exposed by La Martinière;† and in England, by Mr. Pott.‡ Nothing is now better known and established, than that in many cases of bad gunshot injuries of the limbs, the patient's chance of preservation depends almost totally upon the performance of amputation.

Another question, that is not quite so well settled, is at what time amputation should be done in cases of gunshot wounds, where such operation is allowed to be indispensable. In 1756, the French Academy of Surgery conferred its approbation on a memoir written by M. Faure, who was an advocate for delaying the operation until the first bad symptoms were at an end. Mr. Hunter was in favour of the same practice. Upon the whole, however, reason, experience, and authority are strongly against delay. The immediate performance of the operation is urged by La Martinière, La Dran, Ranby, Kirkland, and Larrey. The valuable work of the latter gentleman, contains the most decisive facts in support of this practice; facts, drawn from extensive experience and a comparative trial of both methods.||

But, it is not to be denied, that amputating at once, for sudden injuries, is, on some accounts, disadvantageous.

Gunshot wounds rank as accidents. Every surgeon knows, that a man, who has been long habituated to disease, is more likely to bear an operation well, than another man, who is suddenly necessitated to part with his limb for an accidental injury, while he remains, in other respects, perfectly healthy. The perturbation into which the system is thrown, by the sudden occurrence of an alarming local injury, is also urged as a reason against immediate amputation.

These objections are, in some measure, well founded; and they ought to be allowed to have a certain weight in all cases, in which the propriety of amputating is a matter of doubt on other accounts; but, I cannot agree, that they ought to overrule every other consideration.

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* De membrorum amputatione rarissimè administrandâ, aut quasi abrogandâ.

† Mem. de l'Acad. de Chir. Tom. 4.

‡ Remarks on the Necessity, &c. of Amputation in certain cases. Pott's works, vol. 3.

|| See Relation Historique et Chirurgicale de l'Expédition de l'Armée d'Orient, en Egypte et en Syria. Par D. J. Larrey. Paris, 1803.

It is unquestionably true, that amputation, practised at the moment of the general agitation, caused by the accident, is attended with less success, than when performed in cases, where the necessity for it is induced by the consequent symptoms. But, on the other side, we are to take into the account, how many individuals perish of the symptoms directly following the injury, such as fever, inflammation, and gangrene. Even admitting, what has been sometimes argued, that not more than a third of the operations practised immediately, are successful, it is by no means certain, that, one third of the patients would be saved, if the operation were delayed.*

Let it be remembered also, that in accidents of this nature, there are only two periods, at which amputation can be performed. The first is immediately after the occurrence of the injury, before inflammation arises, and before a disposition to gangrene commences in the limb. This period only lasts a few hours; and, when these have elapsed, the dangers of mortification and death must be faced. To amputate, when the limb is swollen, and in a state approaching to gangrene, would only be to torture the last moments of life.

If these immediate perils are got over, and the wound is brought into a state of suppuration, the violent inflammation and swelling abate, and, while the patient's strength yet remains adequate, the opportunity of amputating is once more afforded.

This is another nice point, which demands the utmost discernment. By a prudent perseverance in the attempt to preserve the limb, the patient's constitution sustains the labour, and success crowns the surgeon's efforts. But, on the other hand, an indiscreet anxiety to save a limb too often proves fatal; and the system, subjected to the ravages of copious suppurations, and of painful incisions for the discharge of matter and foreign bodies, sinks beneath the weight imposed upon it.

There are further reasons for preferring amputation to an attempt to preserve limbs, which have been severely shattered by gunshot wounds.

1. By means of the operation, the patient gets rid of a dreadful contused wound, which threatens the greatest peril to his very existence, and exchanges it for a simple incised wound.

2. The pain of the operation is not, upon the whole, a greater severity, than the aggregate pain arising from the inflammation, irritation of extraneous bodies, and incisions for

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* Richerand Nosographie Chirurgicale. Tom. 1. p. 238, Edit. 2.

their evacuation and that of matter, in cases, in which an effort is made to preserve the limb.

3. The loss of the limb ought not to be taken into the scale; for, the surgeon only amputates on the principle of saving the patient's life by that privation. When life is at stake, and it is more likely to be saved by the operation, than both life and the limb together without the operation, it is our duty to amputate. By this maxim, no doubt, a small proportion of limbs, which might be preserved, will be sacrificed, but the patient's life will be more frequently saved. Limbs, which are saved after such dreadful injuries, are also very often not more useful, than a wooden leg; and the vigour of the constitution is oftentimes irrecoverably lost for a limb, which is rather a burden, than a convenience.

In the army, surgeons may sometimes be justified in amputating limbs, which, perhaps, it might be proper to endeavour to save, under all the advantages and conveniences of private practice. The necessity for the operation must evidently be greatly increased, when circumstances demand the patient's speedy removal from the field of battle to an hospital at a distance. The difficulty of conveyance; the bad accommodation in the military waggons, into which the wounded are crowded; the painful jolting, to which they are there subjected; and the way in which they are exposed to the inclemency of the weather; are all weighty reasons in favour of taking off the shattered limb. When the bones are broken and splintered, the sharp spiculæ are forced by the motion of the carriage still further into the flesh, and thus cause infinite suffering and vast additional mischief. Frequently, when the operation is put off, the disturbance of the parts in the journey so bruises and lacerates them, that the patient perishes in the most cruel agony, before he arrives at the hospital, which is intended for his reception.

When the upper part of the os humeri is fractured, by a musket ball, the necessity for amputating the limb may frequently be obviated by making an incision down the centre of the deltoid muscle, and extracting the splintered head of the bone. I believe, our countryman, Mr. C. White,* of Manchester, first exemplified the possibility of saving the whole arm by the excision of the upper portion of a diseased humerus; and the propriety of a similar proceeding in some gunshot fractures of the upper part of that bone, has been well proved in the practice of M. Larrey. This last judicious surgeon superseded all occasion for amputating the limb, in no less than ten instances, by extracting without delay the head of the humerus and the fragments of bone. After the operation the humerus is to be kept up to the shoulder with a sling and a bandage. In one most remarkable and successful instance, the scapulary end of the clavicle, the acromion, and the head of the humerus, were so broken to pieces, by the ball of a four-pounder, that the removal of all these parts was unavoidable. In some cases, an artificial joint is formed; in others, an anchylosis follows.*

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* Cases in Surgery, p. 57.

THE DILATATION OF GUNSHOT WOUNDS BY INCISIONS, AND THE EXTRACTION OF FOREIGN BODIES, CONSIDERED.

When amputation is not deemed necessary, the surgeon, according to the customary precepts, is to enlarge the aperture of the wound by an incision. Numerous advantages have been alleged to result from such a dilatation. It has been said to facilitate the extraction of foreign bodies, to occasion a beneficial effusion of blood, and to promote the escape of fluids extravasated into the surrounding cellular substance. Dilating the wound by an incision, has been absurdly supposed to convert the fistulous track of a ball into an open incised wound, and thereby render its nature more benign. Another good effect, supposed to result from dilating a gunshot wound, was the division of unyielding parts, which confined, and thus aggravated the internal swelling.

More modern experience has clearly evinced, that the utility of these incisions has been overrated. The knowledge, that gunshot wounds are of very various descriptions, ought at once to condemn the unlimited plan of dilating all of them. When the course of the ball lies in soft parts, and has neither touched a bone, nor a considerable blood vessel, whether the wound has one or two openings, the scheme of dilating it is productive of no good. In gunshot wounds, the aperture in the skin is larger, than in punctured ones and stabs; for, in the former, there is a real loss of substance in the skin, the part of which, first struck by the ball, is generally driven into the wound. By the separation of the sloughs, the canal of the wound becomes still more dilated, so that not only matter, but foreign bodies, may find an easy exit. Incisions also usually soon close again, and the wound becomes, in a few days, in the same condition, as if no dilatation had been made.

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* Relation Historique et Chirurgicale de l'Armée d' Orient en Egypte et Syria, p. 315.

Gunshot wounds are only to be dilated, when there is some plain and beneficial object to be accomplished by it.

No doubt, it is right to extract, at first, as many foreign bodies as possible; for, while they continue in the wound, they always exasperate the inflammatory symptoms, and sometimes create agitation of the whole nervous system. By an early extraction of them, profuse suppuration may often be prevented. Yet, let it be remembered, that the search for foreign bodies is frequently attended with great irritation of the wound; and that it is frequently impossible to find, and extract them immediately, while they lie deep, and fast in the parts. When the wound becomes widened by the separation of sloughs, the foreign bodies generally grow loose; and, on both accounts, their extraction can then be more easily practised. When they are deeply lodged, they often spontaneously approach the surface, on the occurrence of suppuration. Lastly, it is to be observed, that foreign bodies, of smooth figure, have often been found to lie, without the least inconvenience, in parts from which they could not possibly be extracted.

Hence, the surgeon acts wisely, who seeks at first to extract only such foreign bodies as are near the external opening, and are loose, and removable without much irritation. When they make pressure on an important part, a large artery, a considerable nerve, or important viscus, so as to create violent and dangerous symptoms from this cause, an incision is warrantable to remove them, even when deeply lodged. If a large artery bleeds, it is to be exposed and tied, as in other wounds. Sometimes when there is reason to expect a fracture of the skull, an incision may be judiciously made to examine the bone; that is to say, if there are symptoms leading to a suspicion, that a part of the bone is depressed, and makes dangerous pressure on the brain. In this circumstance, it would not only be advisable to examine the state of the cranium, under the scalp, but even to remove such parts of the bone as are either splintered, or beaten inward. Depressed portions of the sternum and ribs may require incisions, just as the same injuries of the cranium.

When the ball lodges in any of the large cavities, incisions are usually improper, because it is impossible to trace the foreign body, and, therefore, they answer no direct purpose. When the ball enters far into the substance of a bone, a dilatation of the wound would also be of no utility.

But, all, that I have said upon this head, is insufficient to guide the surgeon in every case. If the dilatation of the wound, for the purpose of extracting foreign bodies, should be less likely to aggravate the inflammation, than the presence of those bodies, then it is highly judicious to put it into practice.

In every case, in which the ball cannot easily be discovered, one may safely decide to abandon all painful and irritating examinations. Experience shews, that its lodgment rarely creates trouble, or bad symptoms. Lead has been observed to irritate less, than any kind of extraneous body.* Sometimes, however, the ball may be so easily got at, that it ought undoubtedly to be extracted. In some instances, the ball remains on the side of the limb opposite to its entrance, beneath the integuments. If the skin, under which the ball is lodged, be contused in such a way, that it will probably slough, it is to be considered as a lifeless part, and an opening is to be made into it for the extraction of the ball. But, when the ball lies so far from the skin, that one can only just feel it, and the skin itself remains uninjured, it is improper to make a counter-opening. Experience proves, that the wound heals much better, when the ball is left alone, and that the chief inflammation is not in the vicinity of the foreign body, but about the mouth of the wound. In cases, in which a counter-opening had been made, Mr. Hunter noticed, that the same inflammation sometimes attacked it, which took place at the entrance of the ball.

Such instruments as screws, gimblets, and bullet-drawers, ought seldom to be used in extracting bullets. The fingers are commonly the most proper instruments; and, when forceps are judged more convenient, they should not be of a large clumsy construction.

Although one might judiciously omit an incision to extract a smooth, round body, like a leaden bullet, one might not always act with equal judgment in doing so, when the extraneous body is of an angular figure, and large size, so as to be likely to cause immense irritation.

Detached splinters of bone are very irritating extraneous bodies. When their extraction can be accomplished, consistently with the above principles, it ought never to be neglected.

In gunshot wounds, ligamentous bands sometimes appear to compress the tumefied parts beneath. But, it is only when they visibly do so, that the knife should be employed to divide them.

DRESSINGS FOR GUNSHOT WOUNDS, AND CONSTITUTIONAL TREATMENT.

From the degree of contusion, laceration, and sloughing, produced in almost all gunshot wounds, no hope of union by the first intention can be entertained. Supposing the degree of injury is not such as to demand the immediate performance of amputation, and yet the bones are fractured, and the limb otherwise considerably hurt, the surgeon is first called upon to extract whatever splinters of bone and foreign bodies admit of being taken away, without too much pain and irritation. Should any violent hemorrhage exist, which is not a frequent event in these cases, the bleeding vessel must be secured without delay. The limb is then to be laid on a splint, that has upon it a thick pad, and an eighteen-tailed bandage. The wound is to be dressed with dry lint and a pledget of common cerate. The tails of the bandage are to be methodically laid down over each other, and these, with some longitudinal compresses, which may now be placed along the limb, may be wet with camphorated spirit of wine, or else with the saturnine lotion. The first application is to be preferred, when the limb is at all benumbed, and affected with a sensation of heaviness. Such other pads and splints, as may be requisite, are then to be put on the member, and secured with straps and tapes. Lastly, the limb is to be put in the most eligible posture, and be kept as quiet as possible.

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* Vide Encyclopédie Méthodique, Partie Chirurgicale. Tom. 2, p. 188.

If the patient is young and strong, and has not lost much blood, he is to be immediately bled, unless the universal commotion and appearance of torpor forbid the measure, in which circumstance, the surgeon should rather administer cordials, wine, and tonic medicines. In cases of gunshot wounds, the continental surgeons of the present day highly commend the practice of exhibiting an emetic, before the access of the inflammatory symptoms, and gentle evacuants, during the suppuration. As soldiers are usually accustomed to every kind of privation and excess, their stomachs and bowels are seldom in a proper state, and, therefore, the preceding evacuations are said to be the more necessary. Besides occasional bleedings, according to circumstances, the application of leeches to the neighbourhood of the wound, is extremely beneficial, during the inflammatory stage; and, indeed, so are all the means advised for the relief of inflammation.

In the course of the first 24 hours, the swelling of the part, and the inflammatory fever come on. The surgeon is now to apply an emollient poultice, and, instead of the above lotions, use fomentations. Saline and aperient draughts are to be administered, and, if the pain is excessively severe, opium. Should mortification follow, notwithstanding every effort to counteract it, the surgeon is to await the proper opportunity of amputating, which is universally allowed to be, when an inflammatory reddish circle indicates the commencement of a separation of the living from the dead parts.

If the inflammation terminates in suppuration, the quantity of matter is, in some measure, proportioned to the contusion and other mischief; and, when the case prospers, the inflammatory symptoms abate, the eschars are thrown off, the quantity of matter gradually diminishes; the cavity of the abscess is filled up with healthy granulations; the broken bones unite; and the patient at last gets quite well.

Unfortunately, in many cases, things do not go on in this desirable way. The pus does not become less copious, and it assumes a sanious, thin, fetid quality. The greatness of the discharge brings on weakness and hectic symptoms, and the patient is in a dangerous state. Here the nicest judgment is often required in deciding, whether the attempt to save the limb should be continued, or amputation be done without delay.

In the suppurative stage of gunshot wounds, the same internal medicines and diet, and the same external applications, are indicated, which I have specified in the chapter on suppuration.

In cases of gunshot wounds, then, the dressings are to be superficial, and of the mildest description possible; at first some lint and a pledget of white cerate, and afterwards an emollient poultice, are generally the best applications. What good can introducing lint into the orifice of a gunshot wound produce? Is this practice designed to prevent its closure? If it is, the idea is absurd, as gunshot wounds are not very apt to unite by the adhesive inflammation. Fomenting the part, two or three times a day, with a decoction of white poppies, certainly deserves recommendation; for it always diminishes pain, and, consequently, must have a good effect on the inflammation. The consolidation of a gunshot wound is the work of nature. The steps, which she takes to effect it, have been noticed in treating of granulations. A suppurated gunshot wound is only an abscess, in which there are frequently extraneous bodies. To maintain a ready exit for the pus, and to remove all extraneous matter, which may be loose, and sufficiently near the surface of the body, is all that the surgeon can usefully do.

OF WHAT IS TO BE DONE WHEN A CANNON BALL HAS TORN OFF A LIMB.

In this case, some advise the amputation of the stump, in order to procure for the patient an even, smooth incision, instead of an irregular, jagged, and highly dangerous wound. As the limb has sometimes endured a furious concussion, and is almost senseless and motionless, the bone being at the same time often split upward, it is also advised to perform amputation, if possible, above the nearest joint.

Others condemn the operation, in this instance, on the ground, that such wounds are disposed to end favourably without amputation, and that the state of the system does not admit of the operation being done with the best prospect of success.

But, since, when the operation is not done, an irregular wound of this description requires considerable incisions for the extraction of foreign bodies, for the discharge of matter, and for the purpose of shortening the projecting muscles and tendons, the last objection to amputation is not extremely weighty. Such incisions would produce as much, and even more, irritation than amputation, without the production of equal good. Besides, the urgency for the operation is, in many cases, not so great, but that it may be delayed till the irritability of the whole body, arising from the injury, has subsided.

Such wounds having been occasionally cured without amputation, evinces nothing more, than that, in a few instances, it is not impossible to cure them without the operation. The surgeon may here more readily make up his mind to amputate, as the loss of a limb is not in question.

However, the injury may, in particular cases, be so conditioned, that the performance of amputation would not only be unnecessary, but wrong and hurtful.

With respect to amputating above the nearest joint, this must depend on the distance of the injury from the articulation: no one would think of amputating above the knee, when the accident is situated near the ankle.

CHAP. XX.

OF POISONED WOUNDS.

AS poisoned weapons are not made use of among civilized nations, and venomous animals are not numerous in this country, we have not many oppotunities of observing poisoned wounds.

The most common wounds of this description are the bites of gnats, and the stings of wasps, bees, and hornets. The bites of mad animals, and of the viper, are the most serious.

It is highly probable, that the poison, insinuated into wounds, does not always disorder the whole system merely in consequence of absorption. The constitutional symptoms would seem sometimes to happen *per consensum*, before the local poison has had time to find its way into the circulation, as in the bite of the cobra de capello of the East Indies, and of the American rattlesnake. Hence, in the treatment of all severe poisoned wounds, two chief indications arise: 1. To prevent absorption of the poison and its alarming effects, either by quickly cleansing the wound from it, or by rendering its qualities inert. 2. When the constitutional disorder is produced in an inexplicable way, to endeavour to appease it, by medicines of the sedative and antispasmodic kind.

Various means have been used for fulfilling the first object. The principal are, scarifying and cupping the wound; endeavouring to draw out the poison by suction; setting fire to gunpowder placed in the part; applying caustics, or the actual cautery; different kinds of oil; powdered cantharides; or practising the excision of the injured part.

The second indication ordinarily demands the internal exhibition of such medicines as opium, the volatile alkali, camphor, musk, and similar remedies.

STINGS OF INSECTS.

Bees, wasps, hornets, and other insects of this country, produce, in consequence of their sting, a great deal of pain, redness, heat, and swelling in the part affected; but, the injury never gives rise to any alarming symptoms. There is also an extraordinary irritability in the skin of many persons, who invariably suffer more, than the generality of mankind, from the bites and stings of insects.

It is certain, that the sting of an insect is not simply a fine puncture; for, if it were, there could be no cause for such great local uneasiness as it usually creates. When once a bee has completely darted its sting into the flesh, the acrid caustic liquor, called the poison, is pressed from the glands, in which it is secreted, and passing down the channels of the darts, discharges itself into the wound, occasioning an acute pain and swelling of the part, which not unfrequently continues inflamed for several days afterwards. Dr. Hunter being desirous of ascertaining the force of this poisonous fluid, dipped needles into it, with which he pricked the back of his hand; the like experiment he tried on the same part with needles not dipped in this fluid, and he found, that the punctures occasioned by the former grew sore, and inflamed, while the others did not.

But, if the wound, which the bee inflicts, is painful to those who receive it, to the bee it is often attended with more serious harm; for, it inevitably proves fatal, if by any accident the sting is broken off in the act of inflicting the puncture. When the creature strikes its sting deeply into the flesh, and the person starts, and discomposes the bee before it can disengage itself, the sting will almost certainly be broken off, and left sticking in the wound. On the contrary, if the bee is not thus suddenly discomposed, it will bring its two slender darts close together, and withdraw the whole, in which case the wound is always less painful. A wasp is not so liable to leave its sting in the wound, as a bee; the beards of the dart being shorter, and the insect more nimble and vigorous in its operations.*

Lemon-juice, vinegar, Goulard's lotion, cold water, olive oil, and hartshorn, are the principal local applications recommended in these cases. The *eau de Luce*,† which is composed of volatile alkali, and a small proportion of oleum succini, is also reckoned an eligible liniment, especially, when blended with a little olive oil. Sometimes, a great deal of irritation may be prevented by extracting the sting from the part, for, with a magnifying glass, the little dart, if it is broken off and lodged in the wound, may occasionally be seen, and, with a pair of forceps, drawn out. When the patient has been stung in many places, bleeding, mild purgatives, and low diet, ought to be prescribed.

Lombard, a late French writer, in his "*Manuél necessaire au villageois pour soigner les abeilles*," recommends that the wound be pressed, to cleanse it, as much as possible, from the venomous fluid, and then rubbed with alkali, or with a little diluted quick lime, by means of which the properties of the poison will be neutralized. The part is afterwards to be bathed in cold water, when both the pain and swelling will be found to have received considerable relief.

The stings of insects are generally injuries of too trivial a nature to demand the interference of a surgeon.

BITE OF THE VIPER.

The poison of the viper is lodged in capsules, situated at the roots of two moveable fangs in its upper jaw. When the animal is enraged and bites, the fangs rise up, and the venomous fluid in the capsules, being then compressed, flows along the longitudinal grooves in the fangs, directly into the part that is bitten.

The bite of a viper is not invariably followed by the train of severe symptoms, which we are about to enumerate. This may depend on various circumstances; the animal, just before biting the patient, may have bitten something else, so as to have completely emptied the poison-bags. The bite may have taken place through clothes, and a great part of the venom may have lodged upon them.

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* Rees's Cyclopædia, Art. Bee.

† The Spir. Ammon. Succinatus, L. P. will answer the purpose.

Though the poison may be lodged in the wound, there may be a tardiness of absorption, and the virus may therefore be washed off by suppuration, without having affected the constitution. Or, the means made use of may have entirely removed it from the wound. The narrowness and depth of the injury, however, are very unfavourable to any attempt of this kind.

The bad symptoms usually commence almost immediately. An acute pain, and a burning heat, are experienced in the part affected, which begins to swell. The tumefaction, tension, heat, and pain, gradually spread over the whole limb, on which livid spots appear, indicating a tendency to gangrene. In some cases, the whole body is said to be swollen. Dejection of spirits; smallness and weakness of the pulse; oppression about the chest; vertigo, prostration of the strength; headach; nausea, and vomiting, announce the general effect on the system. A fixed pain is felt in the region of the heart, and all the surface of the body assumes a yellow tinge. The urine seems as if it were impregnated with bile. Cold perspirations and convulsions take place, and death sometimes finishes the tragedy.

The bite of the viper seldom proves fatal in this country. It might, however, kill a child, though it does not generally destroy an adult; for, Fontana makes it appear probable, that the danger is in proportion to the smallness of the animal bitten.*

It has been attempted to investigate the nature of the poison; but hitherto without any practical good. We are told by Dr. Mead† and Fontana, that it is neither of an acid, nor alkaline nature.

Fontana suspects the faintness following the injury to proceed very frequently from fear, and he even thinks, it may have a considerable effect in occasionally producing death. For my own part, I do not concur in this conclusion, since we have every reason to believe, that the poisons of serpents are quite pernicious enough in their nature to account for every bad effect. They indeed oftentimes appear to operate on the system in a more sudden manner than through the medium of the absorbents, and in a way, which seems altogether inexplicable. Whether we term it sympathy, or compare the effect with that of electricity, is of little consequence.

TREATMENT OF THE BITE OF THE VIPER.

The treatment is divided into local and constitutional means. By the former, we endeavour to prevent the ill effects of absorption; by the latter, we strive to appease the disorder, of the system, arising either from the absorption of the poison, or in a manner, which we cannot pretend to understand.

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* On the Venom of the Viper.

† Mechanical Account of Poisons.

1. TREATMENT APPLIED TO THE WOUND.

In the first section of this chapter, I have enumerated various means for the purpose of preventing the ill consequences of absorption. The Abbé Fontana informs us, that tying a ligature round the limb on the side of the wound towards the heart, was the only thing, which he observed to be useful. This practice was adopted by the ancients, and it is that, which Ambrose Paré followed in one instance, with an appearance of success. I cannot give my approbation to this method, which takes no step to prevent the poison entering the mouths of the lymphatics, but only stops it after it has entered, from proceeding beyond the ligature towards the thoracic duct. The ligature, when a long time applied, must itself create considerable swelling of the limb, and very serious inconvenience. At length, it is taken away, and what then remains to impede the progress of the virus into the blood-vessels?

Excision of the injured part, as soon as possible after the occurrence of the accident, is, beyond a doubt, the most efficacious and advisable plan. All the other means designed to extract the poison completely from the wound, or to destroy its pernicious nature, being uncertain in their agency, ought always to yield the preference to excision of the part, especially when the fortitude of the patient goes hand in hand with the advice of the surgeon.

Of all local applications for the bites of snakes, the eau de Luce, (which is similar to our spiritus ammoniæ succinatus,) and olive oil, are the most celebrated.

Oil, when applied, must act either by its insinuating itself between the poison and the wounded surface, or by becoming blended with the virus, and rendering it inert. Powder of cantharides produces a copious discharge of matter, by which the poison is probably washed out of the wound. The actual and potential cauteries must act in the same way as excision, by killing the part, and allowing the poison to be taken away when the slough separates. Perhaps, indeed, they may decompose the poison; but, they are not deemed to be so certainly efficacious, as the immediate removal of the wounded part by the knife. Yet, they are certainly, next to excision, the surest means of preventing the apprehended evils.

On account of the smallness and depth of the bite of an adder, the action of caustics, however, may not reach to the bottom of the wound, unless this be first dilated. The liquid muriate of antimony has been particularly recommended in these cases; but, I know not, why it should be preferred to the kali purum and quicklime.

The immediate removal of the bitten part with a knife is the surest mode of preventing dangerous consequences. In doing this, care must be taken to cut more deeply, than the deepest part of the bite. Many persons, however, may think this a severe proceeding for the prevention of such complaints as usually arise from the bite of the adder of this country. The same may be said of destroying the part with caustic, or the cautery. Perhaps, therefore, it will be sufficient to rub the wound well with the spiritus ammoniæ succinatus, or olive oil.

I have heard it proposed to apply an alkaline lotion to the part affected; but, I am not acquainted with any facts, which would lead one *a priori* to expect particular benefit from it. Indeed, the opinion of Fontana and Dr. Mead, that the poison is not of an acid nature, does not make it appear likely to do good upon a chemical principle.

2. CONSTITUTIONAL TREATMENT.

Emetics have been very much extolled by Dr. Mead, for the relief, which they afford, in bringing to a conclusion the nausea and sickness, arising from the bite.

But, the testimony of almost all writers decides in favour of medicines, which possess the faculty of allaying irritability and promoting perspiration. The volatile alkali has obtained the greatest celebrity. Ten drops of the aq. ammon. pur. may be given every hour. This remedy, with a small proportion of oleum succini, is the same thing as the much talked of eau de Luce, which, both as an external application, and an internal medicine, for the bites of serpents in general, has acquired, perhaps, more fame even than olive oil; for, I must not forget to state, that this last remedy has been highly praised for its specific virtue in these cases, not only as an outward application, but, also, as an inward medicine. Opium, musk, and camphor, are other medicines, which practitioners have tried for the prevention and relief of the general indisposition.

For the information of medical practitioners in warm climates, where serpents of a more venomous nature are met with, I think it may be useful to notice some late facts, in favour of the trial of strong doses of arsenic, for the relief of the effects arising from the bites of these animals. For the interesting cases, alluded to, we are indebted to Mr. Ireland, surgeon of the 4th batt. 60th regt. This gentleman acquaints us, that, in some of the West

India Islands, at present in our possession, venomous serpents are very numerous, and one of the most deadly in its bite is found in the island of St. Lucia. It is from three to six feet in length, and appears to be the coluber carinatus of Linnæus. Its fangs are from one and a half to two inches long, and the wound, inflicted by them is generally of considerable extent. The bite usually causes general torpor and insensibility, with vomiting, and a mottled, dark purple, livid swelling of the limb bitten, and it mostly proves fatal in from six to twelve hours. In Martinique, a venomous serpent is found of a smaller size, from one to two, and two and a half feet in length; its fangs being about an inch long, and its bite as fatal as that of the coluber carinatus. Mr. Ireland, it appears, had formerly attended Mr. Chevalier's lectures, in which a trial of arsenic was recommended, from some facts, recorded in Russell's Hist. of Indian serpents, on the authorities of Mr. Duffin and Mr. Ramsay, proving that the Tanjore pill,* of which arsenic is a chief ingredient, is exhibited with considerable success in India after the bites of venomous serpents. At the suggestion of Mr. Chevalier, Mr. Ireland tried arsenic in the following formula: ℞ liquor arsenic.† ʒij, tinct. opii gt. x, Aq. Menth. Pip. ℥iss, to which was added half an ounce of lime juice. The medicine was given, during the slight effervescence, produced by the addition of the latter ingredient. The medicine was repeated every half hour for four successive hours. In the mean time, the swelled parts were frequently rubbed with a liniment, composed of ol. terebinth. ℥ss, liq. ammon. ℥ss, and ol. oliv. ℥iss. When the patient began to be purged, a cathartic clyster was twice administered, and the arsenical draught discontinued. The lacerated edges of the bite were removed in the first instance, and the wound dressed. By nearly similar treatment, four cases were cured, the particulars of which are highly worthy of attention.*

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* The composition of this pill is as follows: "White arsenic, roots of vellinavi, roots of neri-visham, kernels of nervalam, pepper, quicksilver, of each an equal quantity. The quicksilver is to be rubbed with the juice of the wild cotton, till the globules become invisible. The arsenic, being first levigated, and the other ingredients reduced to a powder, are then to be added, and the whole beaten up together with the juice of the wild cotton, to a consistence fit to be divided into pills of six grains each." Each pill, therefore, as Mr. Chevalier observes, contains nearly one grain of the white oxide of arsenic.

† The solutio mineralis arsenici was prepared by Mr. Ireland, according to Dr. Fowler's prescription, which directs 64 gr. of arsenic, and as many of the fixed veg. alkali to be dissolved in a sand heat, and the solution to be made an exact pint, so that ʒij contain gr. j. of arsenic in solution.

BITE OF A MAD DOG.—HYDROPHOBIA.

Of all the poisoned wounds, which happen in this country, the bite of a mad animal is the most dangerous, as it is apt to give rise to one of the most dreadful and incurable disorders to which human nature is liable. It is supposed, that all domestic animals, birds as well as beasts, are susceptible of the poison of the rabid dog; and, perhaps, no animals are exempted from its effects. But, whether every animal, labouring under the disease, is capable of infecting others, or, whether this power is confined to a few only, we are yet to learn. Boerhaave affirms, that the disease has been communicated by dogs, cats, wolves, foxes, horses, asses, mules, swine, apes, cocks of the poultry breed, and even by men, when affected with rabies.† It is to be noticed, however, that we have no facts on record, shewing, that the human subject can impart the distemper, notwithstanding the attendants have in some instances been bitten by the patients. Yet, we must not infer with certainty, that the thing can never occur; for, as Dr. John Hunter has observed, only a few persons out of a large number, bitten by a dog undoubtedly mad, are actually seized with the malady.‡ Van Swieten has cited examples from old writers, where hydrophobia is stated to have been produced by the beak of a cock wounding the hand and arm. But, there is little doubt, that, in such cases, the spasmodic and fatal disease, which ensued, was tetanus, and not hydrophobia. This notion is confirmed by the early occurrence of the symptoms after the bite, namely, within the first, or second day, which is not unusual in tetanic affections, but never, perhaps, occurs in hydrophobia.§

What so frequently occasions the peculiar madness in dogs, has not yet been ascertained; nor is it known, whether it occasionally arises spontaneously in these animals, or, whether, like the small pox in the human species, it is propagated only, by contagion. Though the infection may be received and propagated by other animals, it is maintained, that it never originates except in the canine race.* The hydrophobic poison can only produce its effects by inoculation. It resides in the saliva of the mad animal. Therefore, when a person is bitten through a boot, or other clothing, the danger is much diminished by the chance, that the poison may have been wiped from the teeth, before they penetrated the skin. The face and hands being naked, bites on these part are the most dangerous, and the most quickly followed by the attack of the disease.

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* See Medico-Chirurgical Transactions, vol. 2, p. 393.

† Aph. 1132. ‡ Trans. of a Society for the Improvement of Med. and Chirurgical Knowledge, vol. 1, p 300.

§ See Van Swieten's Comment, on Aph. 1132. Also, Hamilton on Hydrophobia, vol. 1, p. 107, edit. 2.

The symptoms, which ensue in consequence of the bite of a mad animal, are generally very slow in making their appearance. Hence, we may infer, that there is a considerable probability of preventing them in all cases. However, we can only expect to prevent, for when hydrophobia has come on, the instances of a cure are so few, that we can place no vast degree of confidence in any medicine hitherto tried. That something does prevent the disease in many cases is very certain; for, only a few persons are seized with hydrophobia out of the great numbers, who are bitten by almost every mad dog.

I have said that hydrophobia can only be communicated by inoculation with the poison, which is contained in the saliva of the rabid animal. Dr. Hamilton† quotes cases, where the infection was imparted without any bite at all; but then we must suppose, there was some slight scratch, cut, or excoriation, on the parts, which the dog licked, although it were unnoticed.

The human species seem much less susceptible of the infection, than dogs. Four men and twelve dogs were bit by the same rabid dog, and every one of the dogs died rabid, while all the four men escaped, though they used no other means of prevention, than such as we see every day fail. There is also an instance of twenty persons being bit by the same mad dog, of whom only one had the disease.‡ According to Dr. Hamilton, upon an average, not more than one person out of sixteen bitten, takes the distemper.§

SYMPTOMS.

I have mentioned, that the bad symptoms are usually tardy in making their appearance, and even the local injury often heals as favourably as any other wound, attended with an equal degree of contusion and laceration.

The interval, between the infection and the commencement of the disease, varies considerably in different instances. Out of 131 cases, only three patients took the disease before the eighteenth day; none before the eleventh; from the eighteenth to the thirtieth, seventeen were seized; sixty three began to be ill from 30 to 59 days after the bite; twenty-three were attacked from two to three months inclusive; nine from three to four months; two at five months; one at five months and eleven days; one at six months; one at seven months; two at eight months; one between eight and nine months; two at nine months; one at eleven months; one at fourteen months; two at eighteen months; and one at nineteen. To cases happening beyond this last interval, Dr. Hamilton attaches no credit.* One case, related by Dr. Bardsley, on the other hand, seems not to have commenced till twelve years after the bite.† The most frequent time, for the beginning of the symptoms, is, about six or seven weeks after the accident.

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* Hillary on Dis. of Barbadoes, p. 246.

† See Case 3, p. 100, and Case 9, p. 103.

‡ See Dr. J. Hunter's Paper, p. 302; and an excellent article on this subject, in Rees's Cyclopædia. § Vol. 1, p. 31.

A dull heavy pain, first takes place about the wounded part, sometimes supposed to be rheumatic, at other times, attended with heat, or itching. When the bite is in the hand, the pain shoots up to the shoulder and neck, and not particularly to the axilla. The cicatrix sometimes inflames, swells, and emits a discharge. But, long before any unpropitious changes occur in the neighbourhood of the wound, a gloom is diffused over the spirits accompanied with listlessness and anxiety. The patient becomes timid, is distrustful, sleeps unsoundly, and loves solitude. In a few cases, the distemper begins with a paroxysm of shivering.

The night is passed in restlessness. The appetite begins to fail, and some thirst is experienced. And, now the peculiar symptom, which gives the disease its name, the dread of liquids, is discovered, often accidentally on the patient attempting to take drink.

There are a few cases, which cannot, with accuracy, be said to have any melancholy stage; the pain about the wounded part, and the difficulty of swallowing liquids, being preceded by no loss of spirits, nor any kind of mental despondency. Of this nature was the unfortunate case, which was under the care of Dr. Powell, in St. Bartholomew's Hospital, in the summer of 1808.

The patient not only becomes unable to swallow liquids; but, cannot behold them without terror, nor hear them mentioned without disgust. This fear, however, is not the result of a mental aversion to fluids; but, is the consequence of the insufferable sensations, which the attempt to swallow them, or even the sound or sight of them, produces. When the patient attempts to drink, he immediately sobs in a convulsive manner, experiences a dreadful choaking pain, and is seized with general convulsions of his whole frame. Patients have tried to drink with the firmest resolution; but on the liquid approaching their lips, the intolerable disorder excited, baffled the endeavour.* If, with great suffering, a little drink is swallowed, it is sometimes immediately vomited up again, tinged with bile.† This symptom, hydrophobia, then, is not a delirious dread, or hallucination of the mind; but, a matter of experience, which at first surprises the patient himself.‡

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* Hamilton, vol. 1, p. 113.

† Mem. of the Literary and Philos. Society of Manchester, vol. 4, part 2, p. 431.

Even shining surfaces, which reflect the light, as water does, are to hydrophobic persons exceedingly intolerable. This was not the case, however, with the poor woman, who died in the summer of 1808, in St. Bartholomew's hospital; for, she made use of a looking glass, without any inconvenience.

But, the dread of swallowing liquids, although the most singular symptom, constitutes but a small part of this distressing malady. The mind and body are affected with extreme irritability, and excessive susceptibility to all impressions. Hence, the constant watching and inquietude; the impatience and sudden fits of anger from trivial causes; the distress and the violent paroxysms brought on by such circumstances as the slightest motion of the air, the shutting of a door, the buzzing of a fly, &c. Hence, also, the patient's timidity and incessant apprehensions, and the occasional fits of delirium and incoherence, from which he quickly recovers.

In this disease, the fauces are always oppressed with a large quantity of a thick, tenacious mucus, and, as the patient cannot swallow even his own saliva, he is continually spitting out whatever secretions come into his mouth.

The degree of mental derangement differs greatly in different examples; in some it hardly exceeds extreme irritability and impatience; in others, it amounts to muttering and incoherent talking, with rational answers to questions; and in a few it rises into short fits of the most ungovernable rage and fury, the patients biting and tearing themselves, and every thing near them.

At length, the muscles of deglutition are more continually affected with excruciating pain, which gradually extends itself to the diaphragm, and abdominal muscles. The convulsions become more violent, and the fits of suffering more frequent, the patient's countenance is full of horror, and his eyes look red and furious. Sometimes, the patient, notwithstanding such symptoms, retains his senses to the last.

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* Marcet, in Medico-Chirurgical Trans. vol. 1, p. 138.

† Mem. of Manchester Society, vol. 4, p. 439.

‡ See Mead on Poisons, p. 146, edit. 3.

The duration of life, after the commencement of the symptoms, varies from thirty six hours to five days, very rarely to six.

The difference, between rabies canina and tetanus, is not invariably such as to prevent the latter from being mistaken for the former. Tetanus is mostly occasioned by slight wounds of the fingers, toes, or other tendinous parts. It does not commonly begin till some time has elapsed, after the injury, and, perhaps, the wound is healed. It is marked by violent paroxysms of general spasm, which begin about the throat and neck, and are accompanied by a difficulty, or inability of swallowing. These spasms are excited by the most trivial causes; for, merely attempting a change of posture, endeavouring to swallow, or even to speak, will sometimes produce a renewal of spasms over the whole body.* Tetanus and rabies canina also mostly end fatally about the fourth day. Some cases must be exceedingly difficult to discriminate. Dr. Bardsley describes an instance, where a slight injury of the finger, with a splinter of wood, was followed, in about a week, by spasms of the lips, locked jaw, and paroxysms of general spasm. On the third day, after the attack, the young gentleman could not swallow any watery fluids, nor bear them to be brought near him, without fresh and more violent attacks of spasm being thereby induced. A similar case had been seen result from the bite of a horse. In both the examples, here alluded to, a recovery took place.† Hydrophobic symptoms are likewise recorded, to have arisen from local injuries, by Hildanus, and Cælius Aurelianus.

But, it merits notice, that, in tetanus, the spasms generally come on sooner after the local injury, than those of rabies canina; that the jaw is rigidly locked, and the muscles of the neck and back particularly affected; that the muscles are more unremittingly contracted, their action only abating for a time in degree; that there is less fever, less quickness of pulse, and less thirst in tetanus; and, above all, that the extreme anxiety and irritability of mind, which accompany rabies canina, do not prevail.‡

The name, hydrophobia, has certainly led to much confusion, because it creates an idea, that the most essential and distinguishing symptom of rabies canina, is a dread, or difficulty of swallowing fluids. The symptom hydrophobia is far from being peculiar to canine madness. It has followed typhus fever, and accompanied tetanus, hysterics, a variolous sore throat, an inflammation of the stomach, pleurisy, peripneumony, St. Vitus's dance, &c.* Neither is the dread of liquids an inseparable symptom of rabies canina.†

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* Cullen's First Lines of Physic, vol. 3, Chap. on Tetanus.

† Mem. of the Manchester Society, vol. 4, p. 477.

‡ Rees's Cyclopædia, Art. Hydrophobia.

TREATMENT OF HYDROPHOBIA.

As no medicine, hitherto known to the medical world, is capable of infallibly counteracting the baneful effects of the canine poison, practitioners are strongly called upon to impress on the minds of the patient and his relations the necessity of doing whatever is most likely to prevent the constitution from being affected.

As a preventive, surely nothing is more rational, nothing is so forcibly indicated, as the excision of the part bitten immediately after the accident. In all poisoned wounds, the adoption of other steps to prevent the system from being affected, is inferior to the obvious efficacy of excision. It is well known, that a young gentleman of rank in this country, not many years ago, died of hydrophobia, though caustic was applied as a substitute for the excision of the parts. No doubt, the sooner the excision is practised, the greater the chance of success; and it is the duty of the surgeon to urge the immediate performance of the operation; but, when this has been neglected at first, it ought yet to be done, for there is reason to believe, it may often answer, not only several days, but several weeks after the bite, and indeed, at any time before the symptoms have actually begun.

If excision is not practised, the other less certain measures are, washing the wound, applying the actual cautery, or caustics, particularly the kali purum and quicklime, or nitrous acid; enlarging the wound, and applying cupping glasses; and maintaining a discharge from the part for several days.

But in my opinion, whenever there is strong suspicion, that the bite is inflicted by an hydrophobic animal, common prudence dictates a complete removal of the wounded parts by the scalpel.

Were a person to receive a bite close to a largish artery, as the poor woman did, who, in 1808, died of hydrophobia, in St. Bartholomew's Hospital, what practice is proper? Without presuming to lay down, in positive terms, the proper line of conduct, I cannot help suspecting, that, were the part bitten on the inside of the radius, (as it was in the case above alluded to) and were it well known, that the animal was rabid, the surgeon's duty is to cut out the parts, even were he compelled to take out a portion of the artery. And as for the tendons, who would not rather lose the use of a few muscles of the hand, than run the greatest danger of being seized with hydrophobia; which may be regarded as certain death, and that of the most horrid description imaginable?

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* See Mead on Poisons, p. 147. Sauvages Nosol. Method. Edinb. Med. Essays, vol. 1, p. 222 and 227. Ferriar's Med. Hist. and Refl. vol. 3, p. 24—26. Rees's Cyclop. loco citato.

† Hildanus, Obs. 38, and Mead on Poisons, loco citato.

Various specifics for the prevention of rabies canina have been extolled by practitioners, whose credulity, or zeal, has been greater, than their judgment, or sincerity. I must here be content with a bare enumeration of a few of the most celebrated ones. 1. The pulvis antilyssus, consisting of the lichen cinereus and pepper, praised as infallible by Dr. Mead. 2. The Tonquin medicine, which was brought from China by Sir George Cobb, and is composed of sixteen grains of musk, conjoined with a scruple of native, and the same quantity of factitious cinnabar. This is a dose to be repeated in three hours, if sleep and perspiration are not produced. 3. The Ormskirk medicine, said to consist of half an ounce of powdered chalk, ten grains of alum, three drams of Armenian bole, one dram of the powder of elecampane root, and six drops of the oil of aniseed. 4. Cold bathing, and, indeed, half drowning the patient. This last practice was advised by Celsus, and has been extensively followed in modern times. 5. Various antispasmodic and diaphoretic medicines, as camphor, musk, volatile alkali, belladonna, assafœtida, castor, &c.

However, the cases, on which the preventive virtue of such medicines is founded, are all very questionable, inconclusive, and little deserving of reliance. In general, before these remedies are given, steps are taken to free the wound from the canine poison. Then may we not more reasonably impute the prevention to the latter proceedings? Hydrophobia also only happens in a small proportion of those patients who are bitten; and the animal is frequently not mad, when it is supposed to be so.

After the system has been decidedly affected with rabies canina, perhaps, we have not one unequivocal instance on record, where a cure has been accomplished. Much has been expected from opium, in consequence of the disease being attended with such violent paroxysms of spasms; but, though it has many times been tried in extraordinary doses, it has hitherto proved unavailing. The same may be said of musk, castor, camphor, assafœtida, æther, and numerous other antispasmodic remedies. Blood letting; cold and warm bathing; various sudorifics and dieuretics; frictions with mercury, as well as its internal exhibition; the cuprum ammoniatum; the oxide of zinc; vinegar; cantharides; the argentum nitratum; arsenical medicines; blisters; rubefacients; rubbing and bathing the patients with oil, &c. have all been proved to be ineffectual. Perhaps, the most, that experience will allow us to think, with regard to the power of medicine over hydrophobia, is, that the treatment, after the constitution is once affected, may render the journey to the grave more comfortable, but, that it is never efficacious enough to restore health. The present state of our knowledge only affords such melancholy consolation: whether future discoveries will ever do more, it is not for me to predict.*

CHAP. XXI.

OF SOME EXTRAORDINARY AFFECTIONS OF THE SYSTEM, IN CONSEQUENCE OF WOUNDS.

WOUNDS are sometimes followed by very extraordinary symptoms, and such as we can often only attempt to explain, by referring them to the effect of local irritation on a particular state of the constitution. In the affections, to which I allude, the sanguiferous system is not principally disturbed, as it is in the sympathetic inflammatory fever; nor, do the symptoms seem to bear any proportion to the quantity of local injury.

The chief symptoms in question are, restlessness; vigilance; sudden dejection of the spirits; unaccountable prostration of strength; delirium; spasms and convulsions; retention of urine; vomiting; cholic pains; palpitations of the heart; coldness of the surface of the body; oppression in the chest; difficulty of swallowing; locked jaw; tetanus, &c.

I have seen a man die almost instantaneously after the amputation of his leg, although the operation was adroitly performed, the patient not particularly debilitated, little blood had been lost, and there were no appearances on dissection to account for the sudden catastrophe.

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* The rest of the subject of wounds, will be arranged with particular surgical subjects in Part .

Violent emotions of the mind; the irritation of foreign bodies in the wound; the application of a very tight bandage; the distention of the wound with lint; the improper position of the limb, or part; the inclusion of large nerves, and too much flesh, in the ligatures on the arteries; the employment of sutures, &c. are circumstances, to which nervous and spasmodic symptoms may be occasionally ascribed.

Sometimes, these complaints are said to be connected with irritation, not situated in the wounded part. Worms in the alimentary canal, and a disordered state of the abdominal viscera, together with the local irritation of a wound, may seriously agitate the nervous system.

In narrow punctured wounds of tendinous parts, alarming nervous symptoms are particularly likely to occur, and do not admit of very satisfactory explanation. But, though the causes may puzzle the curiosity of mankind, the fact is now firmly established by the records of all ages. Authors have adverted to several circumstances, which certainly add to the danger attendant on such injuries; for instance, they notice, that suppuration frequently takes place in the sheaths of the tendons, so that the matter cannot make its way to the skin, and therefore not only causes considerable local irritation by producing distention, but also increases the concealed mischief by diffusing itself in different directions. No reasoning of this kind, however, can satisfy a philosophical, much less a sceptical mind. We see violent nervous, spasmodic, tetanic affections, take place without any matter, blood, &c. being confined by ligamentous, or tendinous expansions; we see the same complaints sometimes take place in extensive muscular wounds, though not so often as in narrow tendinous ones; and, lastly, as the most dreadful wounds are sometimes exempt from such constitutional symptoms, it is obvious, that all efforts to explain the cause by the nature of the injury must prove unavailing.

Some further remarks, connected with this subject, will be found in a future chapter, on the bad symptoms occasionally originating from the wound made in venesection.

In certain cases of tetanic disorders, it would appear probable, that, the nervous and muscular systems are first disturbed by the local complaint, and that this disturbance exists, and increases afterwards independently of the local injury; perhaps, in consequence of some peculiarity of the constitution, or, what amounts to the same thing, the particular condition, in which that constitution exists.

Yet, in other examples, as I shall presently have to relate, an intimate connexion seems to prevail between the local injury and the constitutional affection, a good while after the symptoms have manifested themselves, the general indisposition being then capable of being materially influenced by the topical treatment, or by cutting off all communication, between the wounded part and the rest of the system.

In general, however, the train of symptoms, enumerated above, require the employment of such means as diminish local irritation, and tend to sooth nervous and spasmodic complaints.

TETANUS.

The complaint is sometimes idiopathic, in which case the treatment belongs entirely to the physician. Though tetanic disorders occasionally affect all sorts of persons, they seem to attack those of middle age more frequently than the old, or the young; the male sex more frequently than the female; the robust and vigorous more frequently than the weak; and the inhabitants of warm climates much more frequently, than those of cold ones. When the disease arises in consequence of a wound, it does not commonly make its attack for some, or even many, days after the accident; very often, when there is neither pain nor uneasiness in the wounded part, and, very frequently, when the wound is even quite healed. The disorder is said to be more common in situations near the sea, than in inland countries. If a wounded person, in a warm climate, expose himself to the cold nocturnal air, he is particularly subject to the disease. In the majority of cases, tetanus is the consequence of wounds, generally of stabs in tendinous parts, and of injuries of the fingers and toes.

Sometimes, however, we see it even in this country, produced by amputations, castration, and other operations, and likewise by gunshot wounds, compound fractures, &c.

It must be clear, however, from the preceding remarks, that the wound is not always the sole cause, and that the disorder would in general not take place, if the wound were not in a particular situation, the patient not of a peculiar temperament, nor under the influence of climate, &c.

SYMPTOMS.

A stiffness is first experienced about the back of the neck. The muscles of the lower jaw next become hard, and incessantly contracted, so that some difficulty is experienced in moving the part. At length, the patient cannot open his mouth at all.

The muscles concerned in deglutition are oftentimes the next affected, and the difficulty of swallowing makes the complaint bear some resemblance to hydrophobia; the similitude is sometimes particularly great, when the patient experiences, as he occasionally does, an abhorrence of fluids, or a considerable aversion to them.* All the muscles of the neck, back, and indeed of the whole body, become successively affected with the most rigid spasm. The limbs are stiff and immoveable, and the muscles of respiration, being prevented from performing their office, the patient dies. In the generality of cases, the patient dies in three or four days; in a few instances, he lives somewhat longer. Tetanus is to be regarded as a very fatal disease; but, yet, it is not, like hydrophobia, always incurable.

The symptoms are sometimes rapid; sometimes, slow in their progress. In the first case, the patient scarcely ever recovers. If he survives the fourth day, his chance of being preserved is greater, than before that period. Tetanic affections never recede, except by slow degrees.

When the spasms are violent and general, the pulse is hurried and irregular; so is respiration. The heat of the body is commonly not increased, and very often the extremities are cold. The head is seldom affected with dilirium, or the least confusion of thought, until the last stage. The digestive functions of the stomach are not much impaired. Sometimes the urine is suppressed, or is voided with difficulty and pain. The bowels are generally costive, perhaps, in consequence of the opium commonly administered. The pupil is neither particularly contracted, nor dilated, and except during the violence of the spasms, the sleep is not much interrupted. The blood, taken away in tetanic cases, does not exhibit the inflammatory crust.

The bodies of tetanic patients have been examined after death, and, among the appearances observed, it is stated, that the pharynx and œsophagus were greatly constricted, and their internal membrane red, inflamed, and covered with a viscous reddish substance.†

VARIETIES.

1. Opisthotonos, when the body is thrown back by spasmodic contractions of the extensors of the spine and head.

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* Mem. of the Manchester Society. Vol. 4. p. 477. Larrey, in op. infra cit.

† Larrey's Relation Historique et Chirurgicale de l'Armée d' Orient, en Egypte, &c. p. 58.

2. Emprosthotonos, when the body is spasmodically bent forward: this is extremely rare in modern times.
3. Trismus, or the locked-jaw.
4. Pleurosthotonos, when the body is affected only on one side.

TREATMENT.

As the disorder frequently makes its attack, after the wound is healed, and, most commonly, when there is no great degree of local irritation; as also topical means and amputation of the part, seem sometimes to have very little, if any, influence over the constitutional disturbance; we might conclude that, after the symptoms have once come on, the connexion now existing between them and the original local cause is not such, that its annihilation is likely to arrest the course of the disease.

Against removing the wounded part, it has been argued, that, if certain constitutional means only avail in a limited proportion of cases; if only the same degree of success attends the combined effect of removing the wounded part, and administering internal medicines; we must infer, that the operation had no influence whatever, and, as causing superfluous pain, and the loss of a finger or limb, it ought not to have been undertaken. It has also been objected to many of the cases, which have been brought forward to prove the efficacy of removing the part, or enlarging the wound, that nothing more is proved, than that the cure was accomplished in this way in a limited number of instances, and generally with the assistance of internal medicines; that perhaps the proportion of success is not greater than when only constitutional means were adopted; and that, though these operations probably do not considerably diminish the chance of preservation, except when a whole limb is amputated, yet there is no positive evidence of their being at all useful.

Upon the whole, however, I believe that experience and authority are in favour of attempting either to alter the state of the wound, or else of amputating the injured part. Doctors Rush and Darwin* recommend the wound to be dilated, and dressed with oil of turpentine, in order to make it inflame. Others have applied caustics. Larrey, a judicious surgeon, who saw many cases of this disease among the French soldiers wounded in Egypt, is a strong advocate for a removal of the part. He tried, but, without any success, the application of tobacco leaves to the wound. Moxa and the actual cautery were equally unavailing. Blisters did not have more good effect, except when the tetanus was preceded by a cessation of suppuration from the wound, in which circumstance they proved advantageous, the benefit being accompanied with a renewal of the suppuration. M. Larrey was led to recommend amputation by the event of the case of tetanus in an officer, who was shot in the foot, and apparently cured by such operation, after opium, tobacco, camphor, &c. had been tried in vain. This author's success tends to the conclusion, that, in all cases of tetanus from wounds of the limbs, it is advisable to amputate as soon as the symptoms commence. In the case, just now cited, the symptoms ceased almost as soon as the operation was done; and, even in cases, which did not ultimately get well, the symptoms were always relieved by such practice. In one instance of tetanus from a gunshot injury of the arm, dilating and scarifying the wound was followed by speedy relief and a cure.*

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* Zoonomia, vol. 4. p. 47.

The symptoms of tetanus being of a spasmodic nature, antispasmodic remedies have been given with the most sanguine hopes of success. Opium, together with the employment of cold bathing, or the cold shower-bath, is the principle one. It is generally prescribed in unusually large doses, in the quantity of, at least, a grain every two hours. It is curious, that, although this medicine is given so liberally in these cases, it never produces any great propensity to sleep, and very seldom ill consequences. If the spasms abate, the opium must not be suddenly relinquished. Half an ounce of laudanum, in a clyster, has sometimes stopped the progress of the disorder. Opiate frictions have also been employed on the cheeks, temples, and neck, when the muscles about the jaw are chiefly affected, and on the back in universal tetanus; but, the best modern practitioners do not much approve of this latter plan.

Frictions with oil have been recommended; but, they have not been found to answer: M. Larrey tried them in Egypt; and found them inefficacious.

The operation of opium may be aided by combining this medicine with such others as any particular symptom may indicate. When the perspiration seems suppressed, blisters, camphor, volatile alkali, musk, antimonial wine, and small doses of antim. tart. may be tried. When there is evident debility, bark, and the liberal use of wine, are recommended in conjunction with the opium, which must always be considered as the grand internal medicine.

Some practitioners have tried the effect of exciting a quick salivation, on the supposition, that the mercurial action on the constitution, might alter that particular condition of the system, with which tetanus is connected.

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* Larrey, opere citato, p. 81.

Larrey, however, found that mecurial frictions always aggravated the symptoms.

Others have advised the internal exhibition of very powerful stimulants, such as the aqua ammoniæ puræ, brandy, wine, &c.

All the best writers on this subject condemn evacuations; but clysters and aperient medicines may, now and then, be administered to remove the constipation caused by the opium.

One might suppose, that, now surgeons are so familiarly acquainted with the utility of hollow bougies, that, in tetanus, there would never be any difficulty in conveying medicines into the stomach. The fact, however, is otherwise: my friend, Mr. Cruttwell, at Bath, some years ago, tried to introduce a flexible catheter down the œsophagus in an example of tetanus; but the attempt excited such violent paroxysms of spasm and suffocation, that the plan could not be put in execution. M. Larrey likewise tried the same thing in Egypt, but was baffled by the exasperated convulsions and sense of suffocation, with which the patient was immediately seized.

As far as I can judge, the facts and observations, adduced by Clarke,* and particularly by M. Larrey, shew, that, in cases of symptomatic tetanus from local injuries, more good is to be expected from a removal of the wounded part, than any other measure. But, supposing this practice not to be acceded to, then the principal plans of treating tetanus may be reduced to three, which in my opinion, seem to claim a preference in the order, in which they are placed. The warm bath is now scarcely ever employed for this disorder, as it is found sometimes to do harm, and seldom any good.

1. Dr. Chalmers's † treatment was repeated cold bathing, and reiterated doses of opium.

2. Dr. Rush, ‡ of Philadelphia, prefers the liberal use of wine and bark, and making the wounded inflame. The exhibiton of other stimulants may be classed with this mode of treatment. Of a similar nature also is the practice advised by Darwin.

3. Dr. Donald Monro || describes the plan of treating tetanus, by bringing on a rapid salivation. This method was communicated to him by a gentleman, who had adopted it with

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* On Diseases of the West Indies.

† On the Diseases of South Carolina.

‡ Transactions of the American Philosophical Society, vol. 2.

|| Edinburgh, Physical and Literary Essays, vol. 3.

success in the West Indies. There it was found to answer in idiopathic cases of tetanus: its inefficacy in tetanus, following wounds, was observed by M. Larrey in his attendance on the French wounded in Egypt.

It may not be improper to add, that, when the wounded part has been removed, the surgeon is not to forget, that medicines may yet be useful, and ought to be prescribed.

CHAP. XXII.

CONTUSIONS.

A contusion is an injury occasioned by the impulse of a blunt instrument against any part of the body, the skin remaining unlacerated.

The consequences of such violence are, a diminution of the tone of the injured fibres, and a rupture of an infinite number of small vessels. The bruised muscles are weakened, and cannot be exerted without pain; and the extravasation of blood causes swelling, and a black and blue discolouration of the skin, called by surgeons an ecchymosis. Sometimes vessels of considerable size are ruptured by the force, and very copious accumulations of effused blood are the result. In contusions of the head, we often see the scalp enormously elevated by hemorrhage beneath it, and large collections of blood are frequently found extravasated in the cellular substance of almost any situation in the body.

Very violent contusions not only affect parts, on which the force immediately falls, they extend even to such as are remote from the place which was struck. The second sort of contusion is what the French have termed a *contre-coup*, in which the injury is to be imputed to the effect of a forcible concussion.

The mischievous effects of a contusion are not always proportioned to the force applied; they often depend on the nature of the injured part. If the bruise take place on a bone, which is thinly covered with soft parts, the latter always suffer very severely in consequence of being wounded, at the time of the accident, between two hard bodies. Hence, bruises of the shin so frequently cause sloughing and troublesome sores.

TREATMENT.

Slight contusions may be considered as occasioning only a weakness of the bruised vessels, and a degree of extravasation in the part. Any common liniment, or corroborant, astringent application, suffices for these accidents. The injured parts may be rubbed once or twice a day, with the linim. saponis comp. or may have linen, moistened with vinegar, cold water, brandy, lime-water, solutions of alum, or of acetite of lead, applied to them. The patient's bowels should also be opened with a dose or two of salts. When muscles are bruised, they ought to be relaxed, and kept perfectly quiet. Nothing is more conducive, than quietude, to the restoration of their proper tone. Rest, one of the above mentioned topical remedies, and a dose of any mild purgative salt, generally complete the cure of ordinary bruises.

When the contusion, however, is of a more violent description, and the quantity of extravasation is considerable, bleeding, and other evacuations, together with the use of leeches, are proper. The topical applications should be such as are mildly stimulating, and, consequently, such as are adapted to excite the action of the absorbents. Sal ammoniac, dissolved in equal parts of vinegar and water, or the aq. ammon. acet. forms an excellent lotion. When the inflammation has subsided a little, liniments containing camphor may be used.

In cases, in which there is no danger of serious inflammation, and the chief indication is to promote the absorption of extravasated fluid, bandages act very beneficially, by the remarkable power, which they have, of exciting the action of the lymphatics, by means of the pressure, which they produce.

It is surprising, what large collections of blood will sometimes take place about the shoulder, and under the scalp, in consequence of bruises. Many surgeons would be induced to puncture such swellings, and let out the extravasated fluid. Without condemning every instance of this practice, I have no hesitation in pronouncing it to be in general wrong and hurtful. In ordinary cases, under the use of discutient lotions, and the employment of aperient medicines, the blood is absorbed with incredible quickness. But, when an opening is made, the admission of the air to such blood as cannot be pressed out, makes this fluid putrify; febrile symptoms arise; the part is often attacked with an erysipelatous redness; and extensive abscesses, sloughing, and death have been the too frequent consequences.*

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* Several cases, illustrative of the evils arising from an external

Should the distention, however, threaten to bring on sloughing, every one must coincide in the propriety of discharging the blood by an incision. Cases of this kind are, by no means, very frequent. I remember, attending with Mr. Russell of Swallow-street, a child, whose whole scalp was prodigiously raised and distended by blood, effused in consequence of a blow. But, in about a week, the swelling entirely disappeared. The treatment consisted of bleeding, purging, and applying the sal ammoniac lotion.

From the observations and cases, published by that experienced surgeon, Pelletan, it appears, indeed, that a puncture may sometimes be advantageously made in collections of extravasated blood; but, then, this is only after discutient means have had a long trial, and the tumor has existed a considerable time.*

The putrid decomposition of extravasated blood, attended with great local irritation, an erysipelatous affection and sloughing of the part, severe febrile symptoms, and death, sometimes take place in consequence of the inflammation arising from the violence of the contusion; for, when the parts unavoidably slough, or suppurate, from the degree of injury inflicted, the sloughs, and matter, become blended with the effused blood, and, in this circumstance, the latter fluid inevitably putrifies.† Here an external opening should be promptly made, and even this will not avail, unless the contents be completely discharged. It matters not, whether the external opening in a collection of extravasated blood is made by accident, or design: putrefaction of such portion of this fluid, as cannot be discharged, and the severe effects, already hinted at, are the consequence.

Besides cases, in proof of the foregoing statements, M. Pelletan has related others, tending to shew, that, when the whole of the extravasated blood can be completely discharged, and the sides of the cavity can be so effectually compressed together, as to exclude the air, the making of an incision may sometimes prevent bad symptoms, instead of inducing them.‡ It is acknowledged, however, that, if an opening is made, and the blood cannot be entirely evacuated, nor the cavity obliterated by compression, such practice leads to a putrefaction of the part of the blood left behind, and does much harm. I must leave

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opening, are detailed by Pelletan, in his Clinique Chirurgicale, Tom. 2. Mém. sur les Epanchemens de Sang. p. 161, &c.

* See Clinique Chirurgicale, Tom. 2. p. 130—131. Cases 10 and 11.

† Vide Pelletan in the Memoir above referred to, p. 139, &c.

‡ Ibid. p. 198—211.

it to the experienced surgeon to decide, whether it is generally in our power to discharge, thus completely, every particle of extravasated blood, especially in recent cases, where that fluid is not contained in one cavity, but is widely diffused in the interstices of the cellular membrane.

In cases, where extravasated blood putrefies, and the whole cannot be discharged, M. Pelletan* suggests, whether it might not be proper to counteract the process by introducing into the cavity alcoholized, or acid injections, &c. I can conceive, indeed, that, by chemical means, we might stop the putrefactive process in the effused blood; but, that the irritation of the injections, on the living, and highly inflamed parts around, would do more mischief, than the putrid blood itself, and must for ever interdict the practice.

CHAP. XXIII.

POLYPI.

A polypus is a fleshy excrescence, growing on a thin pedicle, which is named its root. As it may arise in many parts of the body, it seems proper to class it with general disorders. It is most frequently met with in the nose, uterus, vagina, rectum, meatus auditorius externus, and maxillary sinus. Mucous membranes seem in general to be the surface, from which polypous tumours are found to grow.

The polypus of the nose is the most frequent of all, and is principally of three kinds. 1. Sometimes the tumour is red, soft, and sensible, but free from pain, and, in every respect, like a piece of healthy flesh. This is named the *fleshy polypus*. It is the most common, and, fortunately the most benign of all. 2. In other instances, the swelling is hard, scirrhous, and painful, and is then denominated the *malignant polypus*. It is said to be even capable of conversion into carcinoma. It may either be malignant from its very origin; or from being of a mild description at first, it may have subsequently assumed this unfavourable disposition. 3. The third kind of polypus is properly named by Richter the *polypus of the mucous membrane of*

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* Vide Pelletan in the Memoir above referred to, p. 237.

the nostrils.[*] It is very tough; its colour is pale; and there is a viscid secretion from its surface. At particular periods, and, especially, when the weather changes, it undergoes an alteration of its size. In fact, the tumour consists of the mucous membrane of the nostrils, which is elongated at the part affected into the shape of a polypous tumour, and the disease rather merits the appellation of a *prolapsus of the Schneiderian membrane*, than of a polypus. The whole membranous lining of the nostrils becomes occasionally thus relaxed and thickened, so as to render those cavities quite impervious: a case partaking of the same nature as what has been named the *polypus of the mucous membrane.*

Though such are the principal varieties of nasal polypi, there exist others, which, however, are less common, and important. Some are quite pale, soft, and brittle. Some are hollow, and resemble a membraneous pouch, containing a fluid, or matter of a slimy, pulpy, or even denser consistence. These bear a great similitude to encysted tumours, and are termed *vesicular polypi.* Some polypous tumours are quite smooth, and some knotty, while others have long appendages attached to them.[†]

Mr. John Bell, of Edinburgh, has lately questioned whether there is any such thing as a really malignant polypus, as Pott, and most writers describe. The former gentleman imputes all the ravages and pain, which occasionally attend the disease, to the pressure and distention of the tumour.[‡]

The fleshy polypus may grow at any part of the cavity of the nose; but it most frequently takes its origin from the ossa spongiosa. Sometimes the body of the tumour is situated in the nostril, while its root is firmly fixed in the ductus nasalis, the sinus frontalis, or the antrum maxillare. A polypus can naturally have only one root. But, it occasionally happens, that the tumour is adherent to several parts of the Schneiderian membrane, especially, when the disease has acquired much magnitude, and the lateral parietes of the nose are pressed and inflamed. The inexperienced may mistake such adhesions for roots. The excrescence is originally always shaped like a pear; but afterwards it adapts its figure gradually to the form of the cavity, in which it is situated.

As long as this kind of polypus continues small, it occasions but little inconvenience. The patient usually supposes, that he has caught a tedious cold; for, in damp weather, the tumour swells, and obstructs the nose. In a dry atmosphere, it shrinks, and then such complaints cease. This state, however, lasts only a short time. The polypus becomes gradually larger, so as at length to fill the nose incessantly, and even to cause an external protrusion. The excrescence projects forward into the nostril; extends backward to the throat, where it has more space; and, in general, soon enlarges in such a manner, that it acquires the form of a cylinder, which terminates before and behind, in an irregular protuberance. The anteriour protuberance expands the nostril, and occasions great deformity; the posteriour one obstructs deglutition, and, ultimately, respiration. The polypus, still continuing its progress, elevates the ossa nasi, and separates them from each other; it hinders the passage of the tears into the nose, and thus produces a fistula lachrymalis; and it pushes the septum nasi towards the opposite side, thereby creating not only great deformity, but also a gradual closure of the other nostril. In a still more advanced state, it powerfully distends the whole cavity of the nose, giving rise to severe pains, which extend over the greatest part of the head; exciting inflammation, and ulceration of the Schneiderian membrane, and causing caries of the surrounding bones, together with a most fetid discharge. It is easy to discern, that, when the necessary measures are delayed, the disease may at last acquire an incurable pitch, and from the extent of the caries, even prove fatal.

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[*] In German *schleimpolype.*

[†] Richter's Anfangsgr. der Wundarzneykunst, Band 1. Kap. 21.

[‡] Principles of Surgery, vol 3.

Some polypi are very prone to bleed profusely, and hence, they not unfrequntly cause excessive debility.

TREATMENT OF THE FLESHY POLYPUS OF THE NOSE.

A solution of sal ammoniac, frequently injected into the nostril, is asserted to have effected a dispersion of the tumour. But, this practice cannot have been atttended with much success; for, it would soon have superseded the necessity of adopting more painful measures.

EXTRACTION.

Polypi may either be extracted, tied, destroyed with caustic, or cut off. Extraction is the most common, and proper. This operation is performed with forceps constructed for the purpose. Their blades are perforated by holes, and are internally rough, in order to take more firm hold of the tumour. The handles should be rather long, in order that the instrument may be more firmly closed, and more conveniently twisted.

Forceps, however, are not applicable to all cases. The anteriour part of the polypus is sometimes quite hard, and distends the nostrils so much, that when the forceps are introduced, the blades are so separated from each other by the part of the tumour, which is between them, that the instrument cannot be introduced sufficiently far to take hold of the tumour at a proper depth; or, if introduced to a proper depth it cannot be closed. In such cases, perhaps, one might advantageously make use of a pair of forceps, the blades of which may be separated, and put together again at the joint, while they diverge from each other behind the joint, and touch again at their extremities. After separating the two pieces, the blades might be separately introduced, and then joined together again; and the anteriour indurated portion of the polypus might lie in the interspace, without preventing the closure of the instrument.

It is of importance to take hold of the polypus close to its root; for, in this way, the whole tumour is commonly extracted, and there is less danger in regard to hemorrhage, which is naturally more profuse, when the polypus is broken at the thick, middle, part of its body. This plan may be easily pursued, when the polypus is not too large. But, in many instances, the tumour is so large, and the nostril so completely occupied, that it is impracticable to get hold of the root. In this circumstance, it is often altogether impossible even to discover where the root lies. We must then take hold of the polypus as high as possible, and attempt to extract it. The tumour sometimes gives way at its root, even although the anteriour part is taken hold of; but, in other cases, the polypus breaks where it is grasped, a portion being left behind, and a profuse hemorrhage ensuing. The latter event is void of danger, when the surgeon immediately introduces the forceps again, grasps the remaining piece, and extracts it. This is the most infallible method of diminishing the hemorrhage. In this way, a large polypus is frequently extracted piecemeal, without any serious loss of blood.

After the polypus has been propelled as far forward out of the nostril as it can be, by blowing strongly through the nose, its anteriour part is to be taken hold of with a small pair of common forceps, held in the left hand, and is to be gradually and slowly drawn out, in order to make room for the introduction of the polypus forceps. The more slowly we proceed, the more the polypus is elongated, the narrower it becomes, the greater is the space in the nostril for the introduction of the polypus forceps, and the higher can this instrument grasp the tumour. After it has grasped the polypus as high as possible, it is to be slowly twisted round, and, at the same time, pulled outward till the tumour breaks. It is a very important rule rather to twist, than pull the instrument, and thus rather to writhe the tumour off, than drag it out. The longer and more slowly the polypus forceps are twisted, the more the place where the excrescence separates is bruised, the less is the danger of hemorrhage, and the more certainly does the tumour break at its thinnest part.

When the polypus has given way, an examination should be made, whether any portion remains behind. When the polypus is very narrow at the place where it has been broken, and when the patient can breathe freely through the nose, there is reason to presume, that the polypus has given way at its root. The finger, however, or the probe, when the finger cannot be introduced, obtains the most certain information.

The danger of hemorrhage may always be lessened, as was before mentioned, by slowly twisting the polypus at its root, instead of pulling it directly out. When only a portion of the tumour has been extracted, the surest mode of checking the bleeding is to extract the remaining part, without delay. If, when the polypus has given way at its root, the bleeding should be profuse, we must try ice-cold water, or brandy, which may be injected into the nose.

If the hemorrhage should still continue, it may always be checked to a certainty, how copious soever it may be, in the following manner: roll a considerable piece of lint round the end of a probe; wet it completely through with a strong solution of zincum vitriolatum; introduce it into the nostril, and press it as steadily as possible against the part, whence the blood issues. As soon as the blood ceases to flow, we may conclude, that the pressure acts on the bleeding point. The plan is almost invariably successful.

When the source of the blood lies very deeply in the nostril, it might be difficult to direct pressure precisely against it. At all events, we may then pass a piece of catgut through the nostril, and bring it out of the mouth, by means of a pair of forceps; a roll of lint may next be fastened to the ligature, and drawn through the mouth into the nose, so as completely to stop the posterior aperture of the nostril. The front opening may be filled with a sufficient quantity of lint.

It is generally deemed prudent only to attempt the extraction of such polypi as are of a pale, greyish, or light-brown colour; are trivially, or not at all, painful, unless when pressed; increase in damp weather, and diminish in dry; move backward and forward in respiration; and round the anteriour part of which a probe can be freely passed.

We are advised not to extract those, which are attended with pain in the forehead, and root of the nose; which have been from the first extremely red, and always continue of the same dimensions; which either bleed spontaneously, or from the slightest causes; which sometimes create pain, are fixed in the nose, and cannot be moved backward and forward in respiration; and, lastly, which are hard to the touch, produce a fetid discharge, and will not allow a probe to be passed with freedom round their anteriour portion.

The reason, assigned for this advice, is the impossibility of extirpating such polypi completely, and the danger of irritating a malignant disease, so as to convert it into carcinoma. However, there is certainly truth in the following remarks made by Richter* on this subject:

It is not to be denied, that polypi of the first description may generally be easily extracted with little pain, because they are small, no where adherent, and, in every respect, benign. It is equally certain, that polypi of the latter kind generally cannot be extracted without difficulty; they are large, complicated with adhesions, and bleed profusely. But, is a patient thus afflicted to be left without assistance? When the polypus is so large, that its root cannot be got at, its anteriour part is to be taken hold of, and the tumour extracted piecemeal. Experience does not prove that the polypus, which often bleeds profusely, is apt to occasion a violent hemorrhage in the operation; and even if it should do so, powerful measures may be adopted, with a certainty of success. If the polypus should be here and there adherent to the membrane investing the nostrils, it is proper to separate it before the operation: Richter recommends for this purpose the introduction of long, flat, thin, pieces of tortoise-shell.

I am decidedly of opinion with Richter, that adhesion, immoveableness, ulcerations, disposition to hemorrhage, &c. are not adequate causes for leaving the disease to itself. I am also inclined to think with Mr. John Bell, that no nasal polypi are originally of a malignant nature, and that the terrible state, which the disease sometimes attains, is owing to the irritation, distention, and pressure of the swelling against other parts.

I will not say, that cases do not occur, in which the disease may have committed such ravages, that it would be absurd to attempt to extract the tumour; but, I can conscientiously declare, that I have never seen such a case, neither have some professional friends of mine, in whose abilities I place the greatest confidence.

Sometimes, the greatest part of the polypus extends backward, hanging down behind the palatum molle, towards the pharynx. When only a little of the polypus is visible in the nostril, the extraction must be performed backward in the throat. This is usually accomplished by means of a pair of curved forceps, which are to be introduced through the mouth, in order to seize and tear off the tumour as high as possible above the soft palate. Care must be taken not to irritate the epiglottis, or else a vomiting and coughing are excited which disturb the operation. When the polypus cannot be properly taken hold of, some advise dividing the soft palate, a thing that can very rarely be necessary. As, in this method, the polypus is not twisted, but pulled away, the hemorrhage is commonly copious. If a fragment of the tumour should remain behind, it may in general be extracted through the nose.

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* Anfangsgr. der Wundarzn. Band 1. Kap. 21.

When the polypus is situated both in the throat and the nostril, the above mode of operating might also succeed. However, as its anteriour part would often continue attached, and, after all, require being removed through the nostril, it is best to operate at once in this manner. Another reason for twisting off the anteriour part of the polypus first, is, that the mass in the throat is thus often rendered so loose, that it can be easily extracted. Whenever it is conjectured, that the polypus will come away in two pieces, it is always preferable first to extract the part in the nostril, and afterwards, that in the throat, because the separation of the last is constantly productive of most bleeding. Sometimes, the following plan succeeds in detaching the whole polypus at once. Both the part in the nostril and that in the throat are to be firmly taken hold of with forceps, and drawn at first gently, and afterwards more forcibly, backward and forward, until the tumour gives way.

Polypi are very apt to grow again, especially, when any portion is left behind. Sometimes also several polypi grow at once in the same person; but, I do not believe, that this happens so frequently, as Mr. John Bell would lead one to suppose.

LIGATURE.

The extraction of nasal polypi being constantly attended with hemorrhage, which is sometimes profuse, another more modern method of cure has been put into execution. This consists in tying the root of the tumour with a ligature, by which means, the polypus is thrown into a state of inflammation, suppuration, and sphacelus, and, at length, becomes detached. A silver wire is to be introduced through a double cannula, so as to form a noose at the upper end of the instrument, proportioned in size to the anteriour part of the tumour situated in the nostril. The two ends of the wire are to hang out of the two lower apertures of the double cannula, and one of them is to be fastened to a small ring on its own side of the instrument.

The polypus is next to be taken hold of with forceps, and drawn a little out of the nose. The noose is then to be carried over the forceps and polypus into the nostril, care being taken to draw out the loose end of the wire gradually in proportion as the instrument is introduced further. Silver wire is more easily applied, than any other kind of ligature, on account of its elasticity.

When the noose has been carried as far as possible over the polypus, the loose end of the wire is to be drawn out at the lower end of the cannula, and rolled round the little ring on that side of the instrument. Thus the proper degree of constriction on the root of the polypus may be produced. The wire must be tightened every day, until the tumour has separated.

The ligature is attended with so many difficulties, that the forceps are infinitely preferable, in the majority of cases. Hemorrhage is the only inconvenience, for which extraction is abandoned; and this, as was before stated, is far less dangerous, than is represented. The inconveniences of the ligature are much more serious and numerous. The latter mode of cure is always accomplished with much less expedition. When the polypus is so large as to fill the whole nostril, it is generally impracticable to introduce the noose sufficiently far. The figure of the polypus renders it almost impossible to tie its root; for the tumour commonly expands very much before and behind, and the wire must be carried over the posterior part of the polypus, ere it can be applied to its root. In general, the noose includes only the front part of the polypus, while the root and back portion remain untied, and consequently do not become detached.

The polypus nasi is mostly very sensible, so that tying it proves severely painful. The constriction not only makes the polypus inflame, but the whole extent of the Schneiderian membrane. The pain and inflammation often extend to parts at some distance; such as the throat, eyes, &c. and considerable fever is excited.

When the polypus is tied, it swells very much; and all the complaints, which it previously caused, are exasperated. In particular, the part, situated in the throat, is apt to create such impediment to deglutition and respiration, that prompt relief becomes indispensable. This state is relieved by scarifying the tumour, the size of which diminishes as the blood is evacuated.

During the detachment of the polypus, the fetid discharge must be washed away by repeatedly injecting a solution of alum into the nostril.

CAUTERY.

The cautery, formerly recommended for the cure of the polypus nasi, is now almost entirely rejected; and, indeed, in the manner it was customary to use it, little good could be done. It was applied to the anteriour surface of the tumour in the nostril; and its employment was repeated every time the slough separated. Its action could naturally be only of small extent, as it merely came into contact with a trivial portion of the polypus.

The only cases, in which it might be proper still to employ the cautery, are those, in which the polypus is disposed to bleed profusely from the slightest causes, and in which the patient, owing to debility, cannot bear the further loss of blood. There are a few very uncommon cases, also, in which this plan might be practised instead of extraction, in consequence of the tumour having ligamentous connexions.*

In employing the cautery, the object is not to effect by its direct agency the gradual destruction of the polypus, but to excite such an inflammation, suppuration, and mortification, of the whole of the excrescence, as will lead to this event. A heated trocar is to be introduced through a cannula into the middle of the tumour. Injections into the nostril ought also, in this plan of treatment, to be repeatedly made, as soon as the discharge commences.

CUTTING INSTRUMENTS

Have always been reprobated, because they usually occasion a profuse hemorrhage, and can hardly ever be passed far enough into the nose, without doing mischief. Yet there are instances, in which their use might be productive of advantage. The front of the polypus is sometimes so thick and hard, that it is utterly impossible to introduce the forceps for the performance of extraction, or the cannula for the application of the ligature. In such a case, it might be a judicious step to cut off the front of the polypus.

Polypi of the mucous membrane of the nostrils, mere relaxations of that part, may be benefited by astringent injections, containing alum, muriate of ammonia, &c. Extraction is never applicable to them; but, when necessary, and the thing is possible, they may either be tied or cut away.

When the Schneiderian membrane is universally swollen, and the nostril is quite obstructed, the pervious state of the cavity is to be restored by the introduction of catgut. At first, a very slender piece, and, afterwards, a larger and larger one, is to be used. The employment of flexible tubes has also been recommended.

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* Richter's Anfangsgr. der Wundarzn. Band 1, p. 298, 299.

POLYPI OF THE UTERUS

Are of three kinds, in respect of situation. They either grow from the fundus, the inside of the cervix, or from the lower edge of the os uteri. The first case is the most frequent; the last the most uncommon. Polypi of the uterus are always shaped like a pear, and have a thin pedicle. They are almost invariably of that species, which is denominated fleshy; hardly ever being scirrhous, cancerous, or ulcerated.

The polypus, growing from the fundus uteri, is very difficult to detect in its incipient state. While small, it produces not the smallest perceptible change in the organs of generation. As it enlarges it distends the uterus, and often excites a suspicion of pregnancy, which, however, a more attentive investigation soon dispels. The swelling of the abdomen does not take place in the degree, and space of time, which it does in gestation; the menses continue to flow; the breasts do not become full; and, in the progress of the case, no motion is to be felt. While the polypus lies in the uterus, its growth is slow. Even at this early period, it frequently occasions profuse bleeding. Women, afflicted with the disease, are seldom pregnant; and when they are so, parturition commonly happens prematurely. Sometimes, however, delivery takes place in the regular manner.

As the polypus increases, it expands the os uteri, and, at length, protrudes into the vagina. Sometimes this event is preceded by pains similar to those of labour. When the tumour has arrived in its new situation, as it is no longer compressed by the uterus, it begins to grow more rapidly, and occasion far more troublesome complaints. It presses the bladder and rectum, and thus is apt to disturb the evacuation of the urine and feces. But, in particular, it causes repeated and profuse hemorrhages, which weaken the patient exceedingly, and often bring her to the brink of the grave. The root of the polypus is situated in the os uteri, and is there so compressed, that the blood in the tumour is prevented from returning through the veins; consequently, all the vessels become turgid, and the above effusions of blood are the result. Though these generally cease spontaneously, the least circumstances cause their recurrence, even slight concussions of the body in walking, &c. In the mean while, a quantity of mucous and aqueous fluid is voided, by which the strength is still more reduced. The polypus, the source of this blood and mucus, is frequently misunderstood, and the patient is in a perilous state. Hence, the propriety of always examining *per vaginam*, in case of preternatural discharge from the uterus.

After the polypus has remained some time in the vagina, it at length forms an outward protrusion. Now it again excites additional grievances. As it cannot descend so low, without dragging the fundus uteri downward with it, and occasioning a prolapsus of that organ, a very painful sensation is generally experienced in the pelvis in standing, or walking. As the bladder and ureters are also forced into a deranged position, the evacuation of the urine is disturbed or impeded. The flow of the urine over the polypus, frictions, &c. in this state, frequently make it inflame, become painful, and even ulcerate.

The polypus, situated in the vagina, or protruding externally, may easily be mistaken for a prolapsus uteri. This serious error may as easily be avoided. The polypus is softer, and less sensible, than the uterus in the state of prolapsus. The imperfect prolapsus uteri, in which this viscus is not turned inside out, is betrayed by the os tincæ, which is plainly perceptible at its lower part. In this situation, the polypus may, indeed, occasionally have a depression, resembling the os tincæ, but easy of discrimination from it. A probe can be introduced deeply into the os tincæ; but, not into the other sort of aperture. The polypus resembles an inverted pear, that is, it is thickest below, and becomes gradually thinner upwards. The above species of the prolapsus uteri is thinnest below, and gradually increases in width upward. A probe may be introduced by the side of the polypus deeply to the fundus uteri. When passed by the side of the fallen uterus it is very soon stopped.

It is much more easy to distinguish a polypus protruded externally, from a perfect prolapsus of the uterus without inversion. The os uteri at once characterizes the uterus, as it can here not only be felt, but seen. A probe may be passed deeply into the vagina along the side of the polypus, but not so by the side of the uterus. Besides, the figure of each kind of tumour betrays its real nature.

The inversio uteri is commonly the consequence of a difficult labour, and, hence, is in general easily discriminated from a polypus. While the inverted uterus lies in the vagina, its shape is broad above and narrow below; whereas, the polypus is thin above and broad below. For this reason, in cases of very large polypi in the vagina, the os uteri is little dilated, while it is extremely distended by the incomplete descent of the inverted uterus itself.

When the inverted uterus hangs out of the vagina, its figure, like that of the polypus, is thin upward and broad downward, and, like the latter tumour, it has no aperture at its lowest part. Here an erroneous opinion has often led the way to the most mischievous practice, that of amputating the uterus itself, on the supposition of its being a polypus. It is to be observed, that the inverted uterus includes a circular fold at its upper part, next to the orifice of the vagina. This fold is actually the os uteri itself, through which the body of the viscus has descended. There is nothing of this kind to be felt in cases of polypi. The finger, or probe, may be introduced deeply into the vagina along the side of a polypus, but not so along the side of the uterus. The root of a polypus is firm and hard; the upper thin part of the uterus being hollow, has a soft flabby feel. Difficult labour, the common cause of the inverted uterus, also throws light on the case. Polypi, situated, either on the inside of the cervix, or at the margin of the os uteri, soon protrude into the vagina, and, when large, produce all the complaints above mentioned, except frequent profuse bleedings. These seldom occur, because the root of the tumour suffers no constriction in the os uteri. As such polypi descend out of the vagina, they occasion a prolapsus uteri without inversion.

Uterine polypi, when once extirpated, are not so prone to be reproduced as those of the nose are. They ought never to be pulled off, as the attempt might produce a prolapsus uteri. A few instances occur, in which they might be conveniently twisted off. This is sometimes the case, when the pedicle is very thin, or after the ligature has been applied a certain time.

The ligature is the most proper means of extirpating uterine polypi, and is here much more easy of application, than in the nose.

That a polypus cannot be tied, while it lies in the uterus, is easily comprehensible. But, as soon as it has descended into the vagina, the operation is practicable.

The most convenient mode of applying the ligature is by means of two silver cannulæ.* It is hardly necessary to mention,

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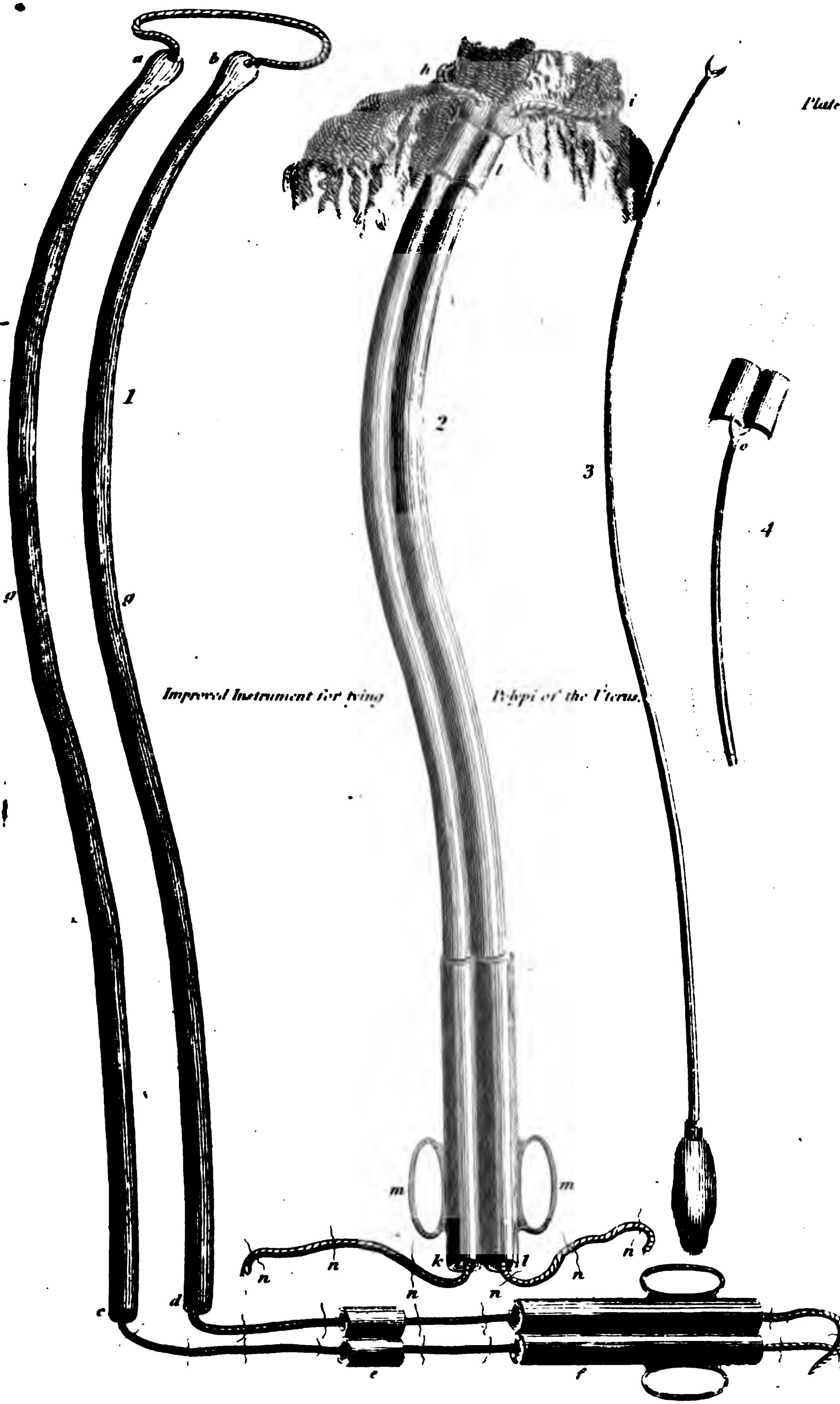
* See Plate 2. A strong ligature is to be introduced through both cannulæ, so that its two ends hang out of the lower apertures of the tubes (fig. 1.) C, D, while its middle portion forms a noose between the two upper apertures, A, B. Both the tubes are to be introduced together to the root of the polypus. One is then to be kept stationary, while the other is to be conveyed round the polypus to the opposite side of the cannula, which is not moved. The ligature being properly applied, in this manner, its ends are to be introduced through the little double cylinder E (fig. 1.), which is only one-third of an inch long,

Plate



Improved Instrument for tying Polypi of the Uterus.

Published April 1 1807 by R.Phillips Bridge Street Blackfriars London.

H. Cooper sc

that bleeding, injections, clysters, &c. may be proper, after the ligature is applied.

When a polypus, having a pedicle attached to the fundus uteri, suddenly falls down, it occasions an inversion of this viscus. In order to relieve, as speedily as possible, the great pain and danger of this case, the surgeon must tie the root of the polypus, as soon and as firmly as he can, and then amputate the tumour below the ligature. The uterus is to be immediately afterwards reduced. This is almost the only instance, in which a cutting instrument can be employed with advantage in the present kind of case.

Fleshy excrescences sometimes grow in the vagina, some of which have a broad, and others a thin basis. The last merit the appellation of polypi, and may be tied by means of a double cannula, when situated deeply, and, with the hand, when they are near the mouth of the vagina.

Polypi may grow in the œsophagus, and cause an impediment to deglutition. They can only be tied, when capable of being brought into the mouth by exciting an effort to vomit, and even then with difficulty, as the patient's respiration being obstructed by this state, the opportunity is only a momentary one. When such tumours are situated far down the œsophagus, their removal by an operation is impracticable. Polypous excrescences in the rectum may also be tied with the aid of a double cannula, and more easily with that of the two single ones. Excrescences in the meatus auditorius may be extracted, or cut off, if near the outer part of the ear.

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but so wide as to be capable of being pushed over the two cannulæ, *a b*, *c d*, with the fingers, as far as the letter *g*, and with the fork (fig. 3,) quite to the letter *l*, (fig. 2,) or letter *o*, (fig. 4.) Then another double cylinder, through which the ends of the ligature have been introduced, F, (fig. 1.) and wide enough to pass over the long double cannulæ, is to join together their lower ends M. (fig. 2.) The ligature is then to be drawn tight, and fastened to the rings.

Herbiniaux has recommended placing pieces of thread, of various colours, on the lower ends of the ligature, with certain interspaces between them, *n*, *n*, *n*, *n*, (fig. 2,) in order to ascertain how thick the root of the polypus is, and how fast the cure proceeds.

This engraving is taken from one in Richter's *Anfangsgr. der Wundarzn.* The ligatures are to be gradually tightened, as they become slack by the destruction of the root of the tumour.

CHAP. XXIV.

ULCERS.

ULCERS present themselves in very various forms; but I think it is sufficient, in a general view of the subject, to consider five kinds: viz. the *healthy*, the *irritable*, the *indolent*, the *varicose*, and the *specific*.

However, before proceeding further, it seems right to state, that sores of every description are chasms, or breaches formed in the substance of the body by a process, termed *ulceration*, in which the absorbents of the part remove the old particles back into the system more quickly, than the new ones are laid down by the secerning arteries; or sometimes sores are the consequence of wounds, which have not united by the first intention; or they are the immediate result of the separation of mortified portions of the body.

1. HEALTHY ULCERS.

Healthy ulcers secrete white, thick pus, which does not adhere to the surface; and their granulations are small, florid, and have pointed tops. As soon as the granulations have risen to the level of the surrounding skin, those next the old skin become smooth, and covered with a thin semi-transparent film, which afterwards becomes opaque, and forms cuticle.

An ulcer, answering this description, is in a healing state, and the surgeon can only be useful by keeping the surrounding skin clean; applying soft scraped lint to absorb the redundant quantity of matter, and covering this simple dressing with a pledget of any unirritating ointment, with a view of preventing evaporation from the surface of the sore; a thing, which would lead to the formation of a scab, and often change the favourable condition of the ulcer.

A roller may be applied, unless it should seem to act perniciously; in most instances, it not only serves to retain the dressings, and as a kind of defence to the sore, but also to support the muscles and skin, which are frequently loose and flabby, from the want of the natural exercise of the limb.

2. IRRITABLE ULCERS.

Irritable ulcers cannot always be known by their appearance, though, in many instances, they can be so discriminated. A sore will invariably partake very much of the nature of the constitution, and when this is known to be irritable, the local complaint will also be often found to be so. A surgeon, however, is frequently quite unaware of this quality of an ulcer, under his care, until, perhaps, at the end of a little time, not finding the sore heal sufficiently quick, he ventures to apply some stimulating application, or to roll the bandage round the limb more tightly, than before. The next day, he is mortified to find, that his patient has passed a miserable night, and several discoloured sloughy parts have formed on the surface, and also at the circumference of the sore. At other parts, the granulations have been rapidly absorbed, and whatever matter lies on the surface of the ulcer, is diminished in quantity, and of a blackish, fetid quality. When the excellent plan of treating many ulcers, recommended by Mr. Baynton, was first introduced into practice, I saw much mischief result from the method being very often indiscriminately applied by dressers to the kind of ulcer under consideration.

Some appearances at once shew the ulcer to be of an irritable kind. When the margin of the surrounding skin is jagged, and terminates in a sharp, undermined edge; when the bottom of the ulcer is made up of concavities of different sizes; when there is no distinct appearance of granulations, but only of a whitish spongy substance, covered with a thin ichorous discharge; when touching the surface causes pain, and frequent hemorrhage; the sore may be set down as an irritable one.

Irritable sores are particularly often situated over the lower end of the fibula, the anterior surface of the tibia, and ligament of the patella.

The applications to irritable ulcers should be of the sedative kind. The steam of warm water acts very beneficially on these cases. A warm decoction of poppy-heads, applied every morning and evening, as a fomentation, by means of flannels, is highly useful. The extract of hemlock, or opium, dissolved in hot water, makes a very useful fomenting liquor, when the irritability is great.

Emollient poultices may be employed as the continued application, and that made of linseed is the best. It is frequently particularly serviceable to lay immediately over the surface of the sore, under the poultice, lint dipped in a solution of opium (ʒiss. to ℔j. of water.) When the weight of the poultice seems to have a bad effect, the lint wet with the above lotion, may be covered with a pledget of simple ointment.

The carrot poultice, particularly when made by boiling the vegetable, and beating it into a pulp, deserves to be noticed as a remedy, which agrees with as many irritable sores, as any thing known.

Powdered carbon and cream have obtained repute for their good effects on irritable ulcers.

It is of great use, in these cases, to have a choice of remedies; for, those, which agree at first, generally lose their virtue after being used a certain time, and it becomes necessary to have recourse to others. Thus six, or seven, different applications may all have a period, at which they are productive of benefit.

Bandages, so used as to make pressure, are always pernicious to irritable sores.

3. INDOLENT ULCERS.

The appearances of indolent ulcers are, as Mr. Home observes, the very reverse of those characterizing irritable ones. The edges of the surrounding skin are thick, prominent, smooth, and rounded. The granulations are smooth and glossy; the pus is imperfectly formed, and is blended with flakes of coagulating lymph, which adheres so firmly to the surface of the ulcer, that it can hardly be wiped away. The bottom of the sore forms almost a level, and its general aspect, as Mr. Home describes, gives the idea of a portion of the skin, and parts underneath, having been for some time removed, and the exposed surface not having commenced any new action to fill up the cavity.

This is the most genuine indolent ulcer. In other cases, the appearances bear some resemblance to those of that opposite kind of sore, the irritable one.

Indolent ulcers form the majority of those, which are to be seen in the large hospitals of this metropolis. Their granulations are endued with a weak living principle, and are very apt to be suddenly absorbed, without any assignable cause.

When poultices are improperly applied a long time to indolent ulcers, the chasms will be filled up with large, loose, pale, glossy granulations, which would never acquire the power of forming a durable cicatrix, if the same relaxing treatment were to be continued. These weak unhealthy granulations, when stimulated by topical applications, undergo a considerable change, becoming smaller, more compact, redder, and free from their glossy appearance; and the cicatrix, which follows, is more apt to continue healed, than when the sores have been healed by relaxing applications.

Solutions of lunar caustic; touching the surface of the ulcer with the caustic itself; diluted nitrous acid; the unguent. hydrarg. nitrat.; and the unguent. hydrarg. nitrat. rubr.; and supporting the sore and the neighbouring skin and muscles with a roller; are the best means, which were used for healing common indolent ulcers, before Mr. Baynton laid before the public his very successful method.

This gentleman's practice consists in applying strips of adhesive plaster round the limb, so as to cover the sore, and, at least, one inch of the parts both above and below the ulcer. The strips of plaster are to be two, or three, inches broad, and long enough to surround the limb, and leave an end about four inches long.

The middle of the strip, so prepared, is to be applied to the sound part of the limb, opposite the inferior part of the ulcer, so that the lower edge of the plaster may be placed about an inch below the edge of the sore; and the ends are then to be drawn over the ulcer with as much gradual extension as the patient can well bear. As many strips are to be applied in this manner as will cover the whole surface of the sore, and one inch of the limb below and above it.

Soft compresses are to be laid over the part; and the limb is to be rolled from the toes to the knee, with calico bandages.

The affected parts are then to be kept moist with cold spring water, which enables the surgeon to remove the strips of plaster, without hurting the patient, and, at the same time, keeps off inflammation.*

The advantages of this method are now fully confirmed by repeated trials; the prominent edges of the sore become levelled; the opposite sides are approximated, so that the cicatrix is rendered smaller, than it would otherwise be; the patient can be cured while walking about; and the new-formed cicatrix is stronger, and more likely to continue sound, than after the old method of treatment.

4. VARICOSE ULCERS.

Varicose ulcers, or such as are connected with a varicose affection of the neighbouring veins, mostly occur either on the inside of the leg, near the ankles, or on the instep. Their size and number vary in different cases, their edges are indurated, high, and callous; the sores are painful when touched; and exhibit a brownish red colour, which spreads a good way beyond the circumference. The limb is habitually affected with a kind of swelling, that is always rendered worse by much exercise, and long continuance in an erect posture, and better by rest and an horizontal position. In the vicinity of the ulcer, small varicose tumours are observable. These are sometimes insulated; sometimes connected together in clusters.* The varicose ulcer, described by Mr. Home, has the look of a mild indolent sore; attended with a varicose state of the trunk and branches of the vena saphena. The sore is seldom deep, and is usually of an oval shape. The case is attended with a deep seated pain, extending up the limb in the course of the veins.

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* See a "Descriptive Account of a New Method of Treating Old Ulcers of the Legs," by T. Baynton. Edit. 2, 1799.

The occasional trouble in healing varicose ulcers, and their tendency to break out again, are generally acknowledged.

A reference to the history of surgery presents us with four methods of treatment. 1. Topical applications. 2. The destruction of the varices. 3. Compression. 4. The operation of tying the trunk of the vena saphena at the back of the knee.

1. With respect to topical applications, I need only state, that all kinds have been tried in cases of varicose ulcers, and have frequently been found ineffectual.

2. Former surgeons, having experienced the difficulty of healing these sores, began to pay more attention to the varices in the vicinity. These were now considered as keeping up the disease, and, it was inferred, that, if they could be destroyed, a cure would speedily follow. The removal of the varices was chiefly attempted in three ways. 1. Ætius and Paulus, of Ægina, recommended the removal of such swellings by excision. The first of these writers confesses, however, that the plan sometimes, instead of proving successful, occasioned another incurable sore. The same thing is observed by Avicenna, and Bidloo has recorded an example that is a remarkable confirmation of the circumstance. 2. Other practitioners have been content with tying the vein above and below the dilatation, and then discharging the contained blood by a puncture. Such was the practice of Fabricius ab Aquapendente. Scultetus objected to this method, that it sometimes failed; and that the wound frequently changed into an irremediable sore. The varices generally returned; and, according to the observation of Fabricius himself, the ligatures were occasionally rendered unavailing, by reason of the numerous venous branches entering the varicose portion of the vessel, and from the same cause, a profuse hemorrhage now and then originated. 3. The varices have also been attacked with caustic, and even the actual cautery. The latter is mentioned by Celsus. I need not detain the reader with an exposition of the well founded objections to both these means.

3. Compression, I believe, is the best mode of curing varicose ulcers. The Arabians were acquainted with its utility in the

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* See Œuvres Chirurg. de Desault par Bichat. Tom. 2. p. 517.

treatment of varices in general. Avicenna describes a compressive bandage, reaching from the lower part of the leg to the knee. Fabricius ab Aquapendente, Scultetus, and Fabricius Hildanus, probably borrowed this mode of treating varices from Avicenna. But, the Arabians only ventured to employ compression, when no ulcers existed. Yet, it is curious, Hippocrates was aware of the advantage of compressing sores; and, it was on his authority, that Paré advised bandages to be applied to ulcers, though not to any great extent beyond the ulcerated part. It remained for Scultetus and Fabricius Hildanus, first to extend the employment of the bandage, which Avicenna used for the dilatation of the veins, and the swelling of the legs, to varicose ulcers. The followers of these distinguished surgeons, however, suffered this practice to decline; nor, was it revived to any considerable extent, until Theden and Desault placed its merit again in a clear point of view. The advantages of the laced stocking for varices were known to Fabricius ab Aquapendente, Wiseman, and Scultetus; and so was dog-skin, which, on account of its elasticity and suppleness, is a very fit material for a compressive bandage. The common roller, however, is the thing generally employed, the limb being compressed with it equally from the foot to the knee. With a bandage, thus applied, over a simple dressing, it is now ascertained, that almost any varicose ulcers may be completely cured.*

4. Mr. Home, however, states, that he has met with cases, which resisted compression. For these he has practised an operation, which consists in tying the trunk of the vena saphena, as it passes over the knee-joint. The patient is to stand on any thing of a convenient height; the integuments are to be pinched up into a transverse fold, and divided; and a ligature is to be conveyed under the vein with a bluntish silver needle. The vessel becomes impervious, where the ligature is applied, and the obstruction serves, instead of a valve, to take off the weight of the column of blood.† For my own part, I am not at all an advocate for this operation having seen it followed, in several instances, by rather severe symptoms. Others have even known it prove fatal,‡ and, I believe, the practice is now abandoned by the best surgeons of the metropolis. Tying the trunk of a vein, we know, must render all the branches turgid, by impeding the free return of the blood to the heart. We should therefore be inclined to suppose a priori, that the above operation would

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* Œuvres Chir. de Desault par Bichat. Tom. 2. p. 518.
† See Home on Ulcers, Varicose Veins, &c.
‡ See London Medical Review, Vol. 2, p. 356.

rather aggravate the varices and ulcers depending on them. Perhaps, experience can hardly obviate this idea; for, in truth, it is difficult to say, whether, in many instances, the confinement in an horizontal posture after the operation, and particularly the use of a bandage, have not done a great deal more for the patient, than the operation itself. Some observations, connected with this subject, will be found in the chapter on Varicose Veins.

5. ULCERS WITH SPECIFIC ACTION.

By a specific ulcer, is implied one, which is complicated with some peculiar morbid action, owing to the state of the constitution, or to the disposition of the part affected. The varieties of such ulcers are almost numberless, and baffle description. Scrophulous and venereal sores are specific, and are noticed in other chapters of the present work; cancer, and the noli me tangere, which are also considered in a different place, partake of a specific nature. Inveterate ulcers, into which many venereal local affections change, after the syphilitic action has been destroyed, are specific; but, as they are mentioned in the chapter on the venereal disease, nothing further is requisite to be said concerning them in the present one.

All that I propose to do now is to point out a few specific ulcers, which cannot be noticed elsewhere in this publication.

Ulcers occur on the instep and foot, with a very thickened edge, and a diseased state of the surrounding skin, very similar to elephantiasis in appearance. Mr. Home observes, that he has several times met with these ulcers in such servants of opulent families, as have led indolent lives, and lived freely. In cases of this sort, the hydrargyrus sulphuratus ruber is recommended by Mr. Home to be used as a fumigation. In some instances, an ointment composed of calomel and hog's lard, or of the ung. hydrarg. nit. mixed with camphor, is said to answer better, than any other application.

A class of irritable ulcers, situated in the vicinity of the ankle, attended with enlargement of the joint itself, and surrounded with a degree of thickening, are much benefited, according to Mr. Home, by poultices and fomentations, containing the conium maculatum. (Hemlock).

There is a kind of ulcer, which does not extend more deeply, than the cutis, but spreads in all directions. The specific morbid action does not continue in the parts, which have ulcerated, but only affects the edge of the skin, where the ulcer is increasing; for the surface, first affected, heals, while the parts beyond are in a state of ulceration. For such ulcers, of which there are several varieties, a solution of the argentum nitratum is the best application.

The last specific ulcer, which I shall here notice, is the *fungated* one. It is seen on the calf of the leg and sole of the foot, shooting out a fungus from the surface. The new-formed substance is extremely broad, and narrow at its root; it is tender, and bleeds from very slight causes. The disease in its origin, somewhat resembles a scrophulous affection of the metatarsal bones, until the skin ulcerates, and the fungus protrudes.

One species of this ulcer contaminates the lymphatic glands in the course of absorption; another kind does not do so. The first case cannot be cured by the internal and external use of arsenic; the second may.

From three to ten drops of a solution, made by boiling white arsenic in water for several hours in a sand heat, may be internally given. For external use, ʒj of this solution is diluted with ℔j of water, and the mixture may be gradually made stronger, till it is of double strength.

A better mode of exhibiting arsenic internally, is to give two drams of the following formula, thrice a day. ℞ Kali arsenicati gr. ij, aquæ menthæ sativæ ℥iv, spiritus vinosi tenuioris ℥j; misce et cola.

This solution, with double the proportion of kali arsenicatum, forms also a very neat external application. Soft bits of lint may be dipped in it, put on the sores, and covered with a simple pledget.

CHAP. XXV.

ENCYSTED TUMOURS.

THESE swellings consist of a cyst, in which is contained a matter, very various in its appearance and consistence. Sometimes it is soft, sometimes quite fluid, and in other instances hard, and even ossified. The cyst of the latter kind, occasionally bursting, the indurated contents gradually protrude outwardly, so as to occasion the appearance of horns. In St. Bartholomew's hospital, some years since, a complete horn was removed from the scrotum by Sir J. Earle. It had begun as a tumour, which, after bursting, protruded from its inside the horny substance.

In the British Museum is preserved a curious specimen of a horn, which grew from a woman's head, and, in all probability, was formed by a process similar to that which I have mentioned. In Mr. Astley Cooper's possession is a still more remarkable specimen, which was given to him by Dr. Roots, of Kingston, and which, in shape and size, bears a close resemblance to a ram's horn! It also grew from the head, and had been preceded by another horny excrescence, similarly situated and shaped, which had likewise been removed. I have lately been informed, that this same patient, who is a gardener at the above town, has at this present time a third horn growing in the identical place, from which the two preceding ones had been cut away. Here we must suppose, that there is a portion of cyst remaining, that has the power of secreting the horny matter.*

When the contents of an encysted swelling are fluid, like honey, the tumour is named *meliceris*; when of a pappy quality, *atheroma*; when fatty, *steatoma*. These swellings have a soft, or hard feel, according to the nature of their contents; but, the consistence of the contained matter cannot always be ascertained by the touch, especially, when the cyst is very thick.

Sometimes, the cyst is very thin, sometimes of considerable thickness; but, in general, though not always, its thickness is proportioned to its age. It is often quite firm, like parchment, or cartilage; and it commonly contains only one cavity; however, this is frequently intersected by several partitions. Steatomatous tumours sometimes consist of several contiguous cysts, which may easily be separated from each other. Atheromatous swellings on the head usually have a very thick firm cyst.

Encysted tumours are usually situated immediately under the skin; but, occasionally, they form in deeper situations. Such swellings, especially steatomatous ones, frequently attain an enormous magnitude. Ordinarily, they are not at all painful. At first, they are constantly moveable, and, probably, would continue so, if all external pressure were kept from influencing them. In time they become immoveable, that is, they become adherent to the skin and subjacent parts.

In many persons, there appears an extraordinary disposition to encysted tumours: more than twenty have been met with in one patient.† Such swellings are seen rather often in most parts of the body: on the head, they certainly occur with particular frequency. I have seen them oftener in this situation, than any other. Mr. Hey notices the frequency of atheromatous tumours upon the heads of adults. He has seen the scalp almost covered with them. In children, the atheroma often occurs on the face, forming tumours about the size of a pea, which are smooth, and appear rather whiter than the skin. These after a time, inflame and burst, the contents are discharged, and the part commonly heals. Hence, the complaint is generally left to take its own course. When such atheromatous swellings take place, as they often do on the eyelids, and, particularly, when they are near the eyelashes, they may excite ophthalmy, and occasion opacity of the cornea. Hence, their extirpation is the most prudent measure. Mr. Hey makes an incision into them, in the direction of the fibres of the orbicularis muscle, presses out the contents, and then extracts the cyst with a pair of forceps.*

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* In the Philosophical Transactions may be seen an interesting paper by Mr. Home, explaining the manner, in which horny excrescences are produced.

† Practical Observations on Cancer, by John Howard, p. 2.

The surgeon may either discuss these tumours, or extirpate them. Their dispersion cannot be accomplished in the majority of cases, and this does not seem extraordinary, when we recollect, that the contents are often a thick, unvascular matter. Besides, even if it were in our power to bring about the absorption of what is contained in the cyst, still the cyst itself would remain, and its extirpation would be requisite.

After promoting the absorption of the contents of encysted tumours, or after discharging them by an opening, it has indeed been recommended to obliterate the cavity of the cyst altogether, by making its opposite sides grow together, by means of external pressure. But there is always some risk in irritating encysted tumours, and cases are not wanting in the records of surgery, by which it is proved, that such diseases are, in this manner, very capable of being converted into fungous and inveterate ulcers, and even carcinoma.†

The most successful applications for discussing encysted tumours, are such as contain sea-salt, sal ammoniac, &c.

Some surgeons have destroyed swellings of this kind with the kali purum and quicklime; but, the method, as being tedious, unnecessarily painful, and attended with a chance of exasperating the disease, is undeserving of imitation.

The best practice, however, is the operation, by which the swellings are cut out. The art of doing this, with adroitness, consists in dissecting the parts, surrounding the tumour, without wounding the cyst. If the latter accident occur, the contents frequently flow out, the cyst collapses, and the continuance of the dissection is attended with more difficulty. It is a great point to remove every particle of the cyst, and, hence, it is satisfactory to take it out entire, that is, without wounding it. When any portion remains behind, the wound will frequently not heal, in consequence of fungous granulations, arising from the diseased part. Unless the swelling be large, a single incision through the skin is sufficient; but, in other instances, it is advantageous to make two cuts in this manner (); first, because it facilitates the removal of the tumour: secondly, because it prevents a redundance of skin, which would take place, if none were removed, and would greatly retard the cicatrization of the wound.

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* Practical Observations in Surgery, p. 517, 518. Edit. 2.

† See some cases in Abernethy's Surgical Works, Vol. 2. p. 115, 119.

After the operation, the edges of the wound are to be brought together with sticking plaster, and a compress and bandage are to be applied.

The excision of encysted tumours, externally situated, is mostly very easy, as the cyst is only slightly connected with the surrounding cellular membrane. But, there may be more difficulty, when the swellings have been in a previous state of inflammation, or, when they are exceedingly large.

CHAP. XXVI.

SARCOMATOUS TUMOURS.

FLESHY tumours, not contained in a perfect globular cyst, like that of the foregoing swellings, have received this appellation. They are of very various kinds, and consequently every attempt to devise appropriate names to distinguish them is at least laudable.

Mr. Abernethy, whose ingenuity is ever active in the advancement of medical science, has published a classification of tumours, and to him we owe the plan of applying to the various species of sarcoma terms deduced from their anatomical structure.*

1. COMMON VASCULAR, OR ORGANIZED SARCOMA.

Under this title are comprehended all tumours, which appear to be composed of the gelatinous part of the blood, rendered more or less vascular by the growth of vessels through it, without having any distinguishable peculiarity of structure. This kind of organization in tumours is the most simple, and, perhaps, may always precede other descriptions of structure.

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* See his "Surgical Works," vol. 2, p. 261, &c.

Vascular sarcoma not only makes its appearance as a tumour, which is altogether extraneous, in regard to the original fabric of the body, it also enlarges natural parts, particularly, the testis, mamma, and absorbent glands.

When this sort of swelling has attained a considerable size, the superficial veins become quite varicose. If left to itself, the tumour generally grows till the skin is so distended that it ulcerates, and exposes the new-formed substance, which sloughs and falls out.

The disease might be got rid of in this manner; but such are the constitutional irritation attending it, and the fetor and frightful appearance of the part, that the rest of the swelling is generally removed by an operation.

2. ADIPOSE SARCOMA.

Fatty tumours are exceedingly common, and are generally surrounded with a very thin capsule, which is only slightly connected with them by means of vessels. Adipose tumours generally grow in a regular, slow and progressive manner; their vessels are neither large nor numerous. Hence, the removal of these swellings is attended with little danger from hemorrhage, and they are very easily separated from the surrounding parts. When they have been inflamed, however, the detachment is more difficult.

3. PANCREATIC SARCOMA.

This is the term, which Mr. Abernethy applies to such sarcomatous tumours, as resemble the pancreas in their internal structure.

The substance of which they consist is composed of irregular-shaped masses. These are connected together by a fibrous kind of texture. This species of sarcoma is sometimes formed distinctly in the cellular substance, but, most commonly, occurs in the female breast, perhaps, originating in the lymphatic glands.

Mr. Abernethy mentions a case, in which the lymphatic glands beneath the jaw were affected with pancreatic sarcoma. This sort of tumour increases slowly, and is not prone to inflame and suppurate.

The morbid structure in question frequently takes place in the breast, a little above, and on that side of the nipple which is next to the arm. In general, the disease is chronic, and does not involve the absorbent glands in the vicinity. But, in a few instances, this species of sarcoma, when situated in the breast, deviates from its ordinary indolent nature, and occasions severe and lancinating pain, an inflammatory state of the integuments, and an adhesion of them to the tumour. The axillary glands also enlarge.

Pancreatic sarcoma is sometimes so irritable a disease, that Mr. Abernethy thinks it may frequently be considered as bad as a cancer. When the glands in the axilla become affected, one generally swells at first, and is extremely tender and painful; afterwards the pain abates, and it remains indurated; another then becomes affected, and runs through the same course.

Dr. Bonttatz, of Moscow, has published an account of a tumour, which resembled the pancreas in its structure, and grew beneath the conjunctiva of the eye.

4. CYSTIC SARCOMA.

This name is applied because the disease contains cysts, or cells. Cystic sarcoma sometimes occurs as a distinct tumour, but is commonly met with in the testis and ovary. The cysts, both in the former and latter part, are capable of being rendered red by anatomical injection. The cavities generally contain a serous fluid, but sometimes a caseous substance. Mr. Abernethy believes this last sort of case, when the testicle is concerned, is peculiarly intractable.

5. MASTOID, OR MAMMARY SARCOMA,

So named from its resemblance to the mammary gland in structure. Mr. Abernethy has not frequently seen this kind of tumour, and his attention was called to the nature of the disease, by a case, in which a swelling, partaking of the above structure, and about as large as an orange, was removed from the front of the thigh. The wound seemed at first disposed to heal, but it afterwards degenerated into a malignant ulcer, which occasioned death in the course of two months.

As this kind of tumour is gradually lost in the surrounding parts, which probably retain a disposition to assume a similar morbid alteration, Mr. Abernethy very judiciously recommends a more extensive removal of them, than was practised in the above example.

Mr. Abernethy thinks this kind of sarcoma more malignant, than the preceding species; but, not so much so as the following are.

6. TUBERCULATED SARCOMA

Consists of an aggregation of small, roundish tumours, of various sizes and colours, connected together by a kind of cellular substance.

Mr. Abernethy has chiefly seen this disease in the lymphatic glands of the neck. The tumours ulcerated, became painful incurable sores, and destroyed the patients. Tuberculated sarcoma is so terrible a disorder, that it may be deemed a fatal one: fortunately it is uncommon.

7. MEDULLARY SARCOMA.

This is commonly seen affecting the testis, and has been termed the soft cancer of that part. The tumour resembles the structure and appearance of the medullary substance of the brain.

The inguinal glands on each side become affected with the same morbid change, in consequence of the diseased state of the testis, and acquire a very enormous size. The skin covering the disease in the groin gives way, and the most prominent of the enlarged glands inflame, and are gradually detached in the form of sloughs. Hemorrhage succeeds the separation of each slough, and can only be suppressed by means of continued pressure. After all the dead portions have been thrown off, the skin heals, and continues cicatrized till the distention of another gland renews the foregoing process, and the patient is at length exhausted.

Dissections after death evince, that the glands in the pelvis and abdomen are affected with the same disease.

Mr. Abernethy relates a case, in which a tumour, partaking of this structure, formed on the thigh. The base of the disease was situated near the bone. The lymphatic glands in the ham, pelvis, and loins, were all affected with the same morbid enlargement. These circumstances were ascertained after death.

The facility, with which medullary sarcoma is propagated along the absorbent vessels, is one of its most striking peculiarities.

It has been conjectured, that the medullary sarcoma is the same sort of disease as the fungus hæmatodes, to which a chapter in this work is allotted.

Mr. Abernethy adds another species of sarcoma, which he calls *carcinomatous*. This I shall omit in the present chaper, because the name does not properly enter into the above arrangement, which is founded on the anatomical structure of tumours; and because carcinoma cannot always be considered as a tumour, the diseased part frequently being shrunk, and even smaller, than in the healthy state; and lastly, because cancer is a sufficiently important subject for a separate chapter.

OF THE GROWTH OF SARCOMATOUS TUMOURS, AND OF CHRONIC INFLAMMATION.

EVERY kind of fleshy tumour, every enlargement of an original part of the body, can only be the effect of an unnatural action in the vessels. Whatever matter is deposited in the interstices of a gland, or any other part, must be placed there by those secerning arteries, which, in the healthy state, only secrete a sufficient quantity of new particles to supply the old ones removed by the absorbents. Thus the action of the secerning arteries, and that of the lymphatics, ought to be equal; and whenever more matter is deposited by the blood vessels, than is taken away by the absorbents, a tumour forms in the disordered part. It is possible to conceive, however, that when original parts are enlarged, the morbid change may be owing to an imperfect absorption, and not to any wrong action of the blood vessels. But, in cases of tumours, which are quite distinct, and which constituted no original part of the body, the formation of the disease is probably always the result of a morbid state of the surrounding arteries.

The process by which sarcomatous tumours, and indolent indurations, and thickenings, are formed, is termed *chronic inflammation*. The blood vessels, which we must generally suppose to be the active organs in these cases, deposit a superfluous quantity of new matter; and to do so, they must assume an increased action, though not of that throbbing sort, which happens in cases of acute inflammation.

It is very likely, that coagulating lymph is the first kind of matter, which is thrown out from the vessels, in cases of sarcomatous tumours; that it then becomes vascular itself, and is converted by the action of its own vessels into the various kinds of morbid structure already mentioned.

In proportion as a tumour increases in size, it compresses the surrounding cellular substance, which becomes converted into a kind of membranous capsule, surrounding the swelling. In sarcomatous cases, the cyst is generally thin; and, sometimes, there is even no cyst whatever.

The growth of indolent tumours does not disturb the constitution; they form in an insidious manner, without increased heat, and, generally without any uneasiness in the part.

A tumour, when once it has begun to form, becomes itself an additional source of irritation, and a cause of increased action in the vessels. Hence, it will continue to enlarge, unless checked by surgical applications, or removed by the knife.

TREATMENT OF SARCOMATOUS TUMOURS.

The growth of all indolent tumours may be retarded by repeated topical bleeding, and the application of linen wet with the aq. litharg. acet.

If the enlargement of a swelling be completely stopped in this manner, the next object is to promote the absorption of the new-formed substance. Mercurial frictions, electricity, blisters, and stimulating topical remedies, are proper for this purpose; but, the attempt generally fails, because, if you stimulate a tumour too much, it is apt to slough, and leave a dangerous, extensive, and frequently malignant, sore; and if you do not stimulate so much, still the irritation employed often renews the increased action, checked by the first kind of remedies, and the tumour begins to enlarge again.

For these reasons, the practice of trying to disperse indolent tumours is not deserving of much praise. The removal of the disease by the knife is the best measure, and the sooner this is done the better; for, a common adipose tumour, now about the size of an apple, and capable of being extirpated with the utmost safety, may, in the course of a few years, become so large as to weigh near fifteen pounds;* and the magnitude of the wound necessarily made in cutting out so large a mass would be very perilous. Besides, sarcomatous tumours, when removed in an early state, are not so apt to leave the surface of the wound in a morbid condition.

When the tumour is known, at the time of the operation, to be either a mammary, a tuberculated, or medullary, sarcoma, care should be taken to make a free removal of the surrounding substance.

The operation is performed in the same way as that of removing a diseased breast; and the reader is referred to the chapter on the latter subject.

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* I remember a fatty tumor, which grew to this size on a man's thigh, and was removed by Mr. Cline, in St. Thomas's Hospital.

CHAP. XXVII.

OF CANCER.

GENERAL REMARKS.

UNDER this denomination, Mr. Home comprehends such diseased appearances, as are capable of contaminating other parts, either by direct communication, or through the medium of the absorbents; and when the distemper approaches the skin, it produces in it small tumours of its own nature, by a mode of contamination, not at present understood. There is (says this gentleman) a disease, by which parts of a glandular structure are very frequently attacked, particularly, the os tincæ, the alæ of the nose, the lips, and the glans penis. This has been called cancer; but it differs from the species, described by Mr. Home, in not contaminating the neighbouring parts, with which it is in contact, and, in neither affecting the absorbent glands, nor the skin, at a distance from it. It is an eating sore, which is uniformly progressive; whereas, in cancer, after the sore has made some progress, a ridge is formed upon the margin, and the ulceration no longer takes that direction. It also differs from cancer in being oftentimes curable.*

Although in this barren part of surgery, I have been willing, to avail myself of any observations, which might tend to introduce discrimination in the application of the term cancer, I am not entirely satisfied with the preceding statement. Does Mr. Home mean us to understand, that, cancer of the uterus does not, after making a certain progress, contaminate the adjacent parts and the neighbouring lymphatic glands? Is it meant, that cancer of the lip never contaminates the neighbouring parts, and the glands under the jaw? And, are we to understand that, in cancer of the penis, the glands in the groin, and the testicle, are never contaminated, as the disease advances?† If such is the interpretation to be given to Mr. Home's account, I think few surgeons of experience and observation will coincide with him. The attention of the reader will presently be requested to other circumstances, which, in my opinion, will enable the practitioner to distinguish cancer from other kinds of disease.

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* Home's Observation on Cancer, p. 146.

† I have seen in St. Bartholomew's Hospital one case, in which both the testes became affected, in consequence of a cancer of the glans penis.

The cases, adduced by Mr. Home, are strongly in support of the opinion, that cancer is at first entirely a local disease. They also tend to establish another point, namely, that cancer is not a disease which immediately takes place in a healthy part; but, is a distemper, for the production of which, the part must have undergone some previous morbid change. Thus, we see pimples, small tumours, or warts, upon the nose, cheek, or prepuce, remaining for ten, fifteen, twenty, or thirty years, without producing the smallest inconvenience; but, at the age of sixty, or seventy, upon being cut in shaving, bruised, or otherwise injured, changing into cancers. The same point, also, seems to be confirmed by the many indurations and indolent tumours of the breast, which remain quiet for years; but, on being irritated by accidental violence, become cancerous.

Cancer is a disease, that is said to prevail much in particular families, and, for this reason, has been regarded as an hereditary complaint. We are not to understand, however, that this is so much the case, that because a mother has a cancer, her children must necessarily be afflicted with the same disease. It is only to be understood, that where parents have had cancers, the offspring are somewhat more likely to be affected in the same way, than the children of persons entirely healthy.

Another position, which I have to lay down, is that cancer is rather a disease of old, than of young persons. Exceptions to this remark undoubtedly occur. Mr. Home mentions an instance of cancer in the breast of a young lady, aged fifteen. The true cancerous structure, however, is seldom seen under the age of twenty-five, or thirty.* Cancer of the eye is most frequent in children, although, from the observations of Mr. Wardrop, there is some reason for believing, that, what has often been regarded as this disease, is, in reality, the fungus hæmatodes of that organ. The cancer scroti is frequently observed in young lads.

Cancer is most prone to attack the female breast and the uterus. It seldom affects the breasts of the male sex, though I have seen one example, that was supposed to be such; and also another case, which, though it resembled cancer externally, had not internally the carcinomatous structure; but, if possible, was a worse affliction than cancer, being complicated with a general disease of the glands, in the course of the abdominal aorta, which were immensely enlarged, and changed into a greenish substance, much like turtle. This case was in St. Bartholomew's Hospital last winter. It often invades the testes, lips, penis, and tongue, the miliary glands of the skin, and many other parts of a glandular structure. On the whole, though women may not so often have cancerous lips, they are much more subject to the disease than men:* the change of the constitution at the cessation of menstruation is thought to favour the access of the malady; and this circumstance, together with the uterus and mamma being the parts, on which the distemper is most disposed to make its attack, fully accounts for the great liability of the female sex to cancer.

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* Wardrop on Fungus Hæmatodes, p. 189.

The disease unquestionably appears to be more malignant, in some situations, than others. Relapses are very common after the extirpation of a cancerous breast; but they are not frequent, when a carcinomatous lip, or testicle, has been taken away in proper time. It is said, that a part of a scirrhous tonsil may be left behind in an operation; and, yet, the circumstance will not hinder the patient from receiving material relief, since cancerous ulceration is, in this instance, not disposed to break out, with ungovernable malignity, as usually happens when a portion of other cancerous tumours is left unremoved in an operation.

M. Roux has remarked in the third volume of Desault's works, that the skin, the cellular substance, the mucous membranes, the glandular secreting organs. and, perhaps, the lymphatic glands, are the only parts of our system, which are capable of being primarily affected with cancer. This author does not think, that the disease affects certain parts exclusively; he believes, that it is its nature to extend to a great many; but, then, this is consecutively and by propagation. He thinks, that the disease never begins by attacking muscles, serous membranes, tendons, cartilages, &c. It will be universally allowed with this writer, that, in a vast number of cases, the skin is the primary seat of cancer. The skin of the face seems particularly disposed to be affected, whether we refer the circumstance to its delicacy, its great vascularity, or to its being frequently exposed to external irritation. Other parts of the skin, however, are sometimes attacked. Wiseman has seen a cancer on the scalp; Gooch, on the inside of the thigh; and Richter, at the navel. In chimney sweepers, cancers have frequently occurred on the back of the hand, or foot. It is not contended, that the subcutaneous cellular substance might not contribute to the developement of the disease; but it is maintained, that the case is very different from that, in which the latter texture is primarily invaded. The affection of the skin, preceding cancer, is represented as being constantly determined by external causes, and not, in general, without a long continuance of them. Thus, for instance, in cancer of the lips, or other parts of the face, the disease is at first a small pimple, or slight excoriation. Being incessantly irritated, the excoriation spreads, or the pimple enlarges and ulcerates. The part becomes acutely painful; an acrid irritating discharge takes place; and the veins around become varicose.

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* Howard on Cancer, p. 9.

In general, cancer of the skin, when left to itself, is slow in its progress, especially, with regard to its effects on the constitution.

Certain affections, peculiar to the cellular substance, may, according to the above author, terminate in cancer, while the skin and subjacent parts are at first sound. This second primary seat of cancer, however, is allowed to be less frequent, than the skin. But, in proof of its being so sometimes, the tendency of some encysted tumours to become cancerous is adduced, a change that is also mostly an effect of accidental circumstances.

Mucous membranes are even more frequently than the skin, the primary seat of cancer. To this place, we must refer such cancers of the eye, as begin on the conjunctiva, cancers of the nasal cavities, tongue, œsophagus, stomach, bladder, uterus, penis, and intestines, particularly the rectum. In all these organs, it is believed, that cancer first commences in the mucous membrane, and that the neighbouring parts are subsequently invaded, as the disease spreads. It is noticed, however, as an unaccountable circumstance, that we never meet with cancers of the pulmonary mucous membrane.

The causes of cancer in the mucous membranes are not less various, than the states, which precede the distemper in these organs.

1. In some few uncommon instances, the disease follows different affections, which, naturally, have no tendency to it. Thus, certain fungous diseases of the pituitary membrane, when rashly irritated by local applications, or fruitless attempts at complete extraction, are sometimes rendered cancerous. The same remark is made on certain venereal ulcers, which at first only affect the surface of the glans penis, but, afterwards, assume a cancerous disposition, and attack the greater part of the penis.

2. Sometimes the parts would appear to be at once struck with the cancerous disorganization, nothing being discernible but a fungous ulcer, of more or less extent, unattended with any vestiges of a previous tumour. Of this nature, are some cancers of the stomach, especially such as are situated at the lower part of this organ, and have been thought to be caused by hard drinking. Most of those about the cardiac orifice present the

same character; as well as some cancers of the intestines and uterus, and almost all those of the bladder.

In some instances, the influence of active and almost permanent external irritations, in causing cancer of mucous membranes, is quite evident, as is illustrated in the abuse of spirits. On other occasions, the distemper seems to arise spontaneously, perhaps, from unknown dispositions, local, or internal.

3. But in general, cancer of mucous membranes begins with a more or less considerable tumour, termed scirrhus, the mechanical effects of which depend on its situation. Thus, in the pylorus, it sometimes completely obstructs the passage of the aliment, and, in the rectum, renders the evacuation of the feces difficult and painful.

It is conceived, that there is a vast difference, (though it is not known what) between this first degree of cancer, in mucous membranes, and that state, which is the forerunner of cancer in a gland, notwithstanding both affections are expressed by the same term.

The scirrhus of mucous membranes, in important organs, as the stomach, intestines, uterus, &c., mostly proceeds from general causes. According to M. Roux, the same may be said of cancer in the breast. It is in such examples, that, among the causes suspected, must be enumerated, an acute susceptibility in the constitution, the principal revolutions of life, long grief and trouble, the suppression of natural or artificial discharges, &c., and, if an hereditary organic disposition to cancer is admissible, it is in this kind of cases.

By such observations, however, the influence of external irritations is not meant to be excluded.

Cancer of glandular secreting organs has more precise limits, than the same disease in any other structure. Take, for example, cancer of the breast, or testicle. The gland, says M. Roux, is already deeply disorganized, and yet the skin may remain sound. The glandular secreting organs, susceptible of being primarily affected with cancer, are, according to this author, very few. The lachrymal gland, he affirms, is never attacked, except in consequence of the progress of cancer of the eye. The salivary glands are said never to be the first seat of cancer, and, according to this gentleman, the breast and testicles appear to be the only glands exposed to the primary attack of that distemper. I believe, however, few surgeons in this country will join in this observation. In the two last organs, the disease is more constantly, than in mucous membranes, preceded by the state called scirrhus. In Desault's works, however, one instance is mentioned, where a lady, arrived at the critical period of life, was attacked with a considerable swelling of the breast, unattended with induration, but rapidly ending in a large cancerous ulcer, that proved fatal in less than three months. But such cases are rare, and the disease is almost always preceded by induration and scirrhus, during the existence of which, the tumour is, for the most part, indolent. It is only the essential nature of cancer to cause acute pain, after it has attained a certain advanced state, just as it is its character to affect particular structures.

Scirrhus of glandular organs is mostly produced by external causes, though frequently, especially in cancer of the breast, an internal disposition has influence. This observation seems to be proved by the disease occurring with particular frequency, at the revolution, which happens in the female constitution at the cessation of the menses. But, the fact, that the disease may sometimes arise entirely from external violence, seems to derive confirmation from scirrhus of the breast in men having been observed to proceed from such a cause. This circumstance is said to have been noticed by Hunter, Pouteau, and Pegrilhe. In Desault's works, however, it is confessed, that facts of this description are not numerous; though they serve as an argument against the sentiment, that cancer of the breast is always owing to a revolution in the menstrual evacuation.

That there is a material difference between scirrhus of the stomach, intestines, and uterus, and that of the breast and testicle, is beyond a doubt; but, in what such difference consists, is not exactly known.

The author of the memoir on cancer, in Desault's works, appears to have believed, that, perhaps in all instances, cancer of the lymphatic glands is a secondary affection, though indeed, out of respect for the sentiment of others, these parts are classed among those, in which the disease may be primarily seated. Mr. Wardrop has seen two instances of primary cancerous affections in lymphatic glands; and similar cases have occurred to Mr. Abernethy.*

The foregoing observations, then, tend to prove, that the primary seat of cancer is confined to a certain system of parts. In Desault's works, the doctrine is also maintained, that cancer in its origin is entirely a local affection; not, indeed, that it is invariably independent of a particular state of the constitution; but, that it is never the effect of a cancerous virus pre-existing in the system.

In the same valuable publication, the progress of cancer is next considered. 1. After the commencement of the local affection, the neighbouring parts soon become disorganized. 2. After this first progress, which is only an extension of the local disease, the nearest lymphatic glands swell, and are the first parts at a distance participating in the disorder. 3. The last stage of cancer is marked by the effects of the local disease on certain very remote organs, and on almost every function.

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* See Wardrop on Fungus Hæmatodes, p. 188.

In the first progress of a cancerous affection, the adjacent parts are not attacked according to their degree of proximity. The surrounding cellular substance, indeed, is soon affected; but, then, it is to be recollected, that there is an intimate communication between the cellular substance, which composes our organs, and that which forms their external covering. Therefore, we cannot be surprised at the facility with which diseases are propagated, wherever the cellular substance abounds. Here we are to regard it as a means of communication, and, in Desault's works, it is contended, that through the medium of it, all the adjoining parts do not participate in cancerous disease with equal readiness.

In general, whenever the skin is near the focus of the distemper, it is in it that the first vestiges of the extension of the malady manifest themselves. This is observable in the cancer of the breast, and in that which follows encysted tumours in the cellular membrane. The organization of the skin may be already injured, and the surface of the tumour ulcerated, while the whole swelling may still be moveable, and the disease not have extended itself at all to the layers of muscles, or other subjacent parts. We should rather say, that cancer, in its progress, is always prone to invade such neighbouring structures first, as are of a nature to be sometimes the primary seat of the malady.

On the other hand, when cancer affects organs, which are externally covered by a serous membrane, the latter part only becomes affected in the most advanced period of the disease. Thus, scirrhus of the pylorus exists a long while, without the peritoneum being at all diseased. Cancerous affections of the testicle prevail a long time without the tunica vaginalis becoming affected. It is remarked, however, in Desault's works, that the more the local progress of cancer is limited by particular circumstances, the more rapid and formidable are the effects of the disease on remote parts, as, for example, the lymphatic glands.

Notwithstanding the resistance, which certain parts at the circumference of a cancerous affection, appear to make against the extension of the disease to them, a period at length arrives, when the propagating force overcomes, both the effects of the particular structure of certain organs, and the influence of the vital properties. All the parts, comprehended within the sphere of the activity of the disease, are affected with one common disorganization, and soon every vestige of them is utterly lost. Perhaps, the vessels are the only parts, which survive in the midst of the morbid ravages; and even they sometimes increase in number and size, apparently, to support all this extraordinary alteration of parts. The hemorrhages, which almost always attend the latter stages of cancer, are also a proof, that the blood vessels are not altogether spared by the distemper. Even the bones, when they are subjacent, at length suffer from caries and absorption. But, besides this local alteration, to which the bones are subject, it is asserted, that the whole skeleton may participate in the general influence of the disease.

It is difficult to fix precisely the period, when cancer ceases to be strictly a local affection, and when it begins to extend its fatal effects to some parts or the whole of the animal economy. The contamination of the lymphatic glands, and the effects of the influence received by certain systems of organization, and most of the functions are to be considered by themselves.

In a cancerous affection of long duration, the lymphatic glands, with which the diseased part communicates, almost always swell. The same thing sometimes happens in the very commencement of the disease, while the part is only in the state of scirrhus. On other occasions, such complication does not take place till the local affection is in an advanced stage. It has already been stated, (though the remark is far from being generally or constantly correct) that the readiness, with which the absorbent glands become affected, were frequently proportioned to the difficulty with which cancer, in some situations, extended itself to the nearest parts.

It is the nature of all permanent local affections to spread, to derange the natural order of the phenomena of life, and to alter the organization of certain remote parts. Hence originates, that extraordinary series of symptoms, which have a common resemblance in all the cases, which produce them, though some are marked by the particularities appertaining to each affection.

In cases of cancers, which cannot be removed, nor cured, the following numerous symptoms, depending on a general disturbance of functions, attend the latter progress of the disease.

The digestion begins to fail; most patients are averse to the generality of aliments, and even vomit up whatever little they swallow. Some individuals, however, have a voracious appetite. The imperfection of nutrition causes the patient to fall away, look thin, and decline into a state of marasmus. The serous exhalation from the cellular substance is not at all affected; nor do dropsies often occur, except when the cancer is in an organ covered by a serous membrane. The secretions are much affected by the general disorder of the functions of life, as may be judged of, by the almost continual diarrhœa, and the daily changes visible in the bilious and urinary secretions. The incessant and increasing pain brings on general debility, which is also kept up by the incessant losses going on, that are never repaired, and by the privation of sleep. To such effects, destructive of the source of life, hectic fever is to be added ; and, as soon as it begins, fresh grievances commence, and the disease advances with increased rapidity towards its fatal termination. Hitherto, the intellectual faculties remain perfect ; but, sometimes, in the latter stage of the case, the patient loses all consciousness of his state.

In Desault's works, are next considered the particular effects, which the disease has upon certain organs, namely, the skin and bones. In the majority of cancerous diseases, the skin has a yellowish or lead coloured tinge, and is dry and scaly. The bones become deprived of their organized part ; the calcareous substance predominates in them ; and they become, in the latter stages of cancer, remarkably friable and brittle.

The preceding assemblage of a variety of circumstances constitutes, what has been termed, a cancerous diathesis.

The duration of this state varies much in different cases. Some patients soon fall victims to the progress of the disease ; while others lead a long life of misery and suffering. A few individuals, in whom the distemper becomes almost stationary, suffer little more, than the anxiety and disgust inseparable from the complaint. During youth, cancerous diseases are said to make much more rapid advances, that in old age. The nature of the constitution, though not exactly understood, also makes a vast difference. The progress of the disease may likewise be accelerated by the situation, in which the patient resides, by diet, mode of living, painful emotions of the mind, the use of improper applications, &c.

Many writers have referred all the phenomena of a cancerous diathesis to the existence of, what they have called, a cancerous virus, which they suppose to be formed in the seat of the disease, and thence conveyed by absorption over the whole system. This doctrine, however, wants foundation. We see the lymphatic glands often become affected, while the disease is only in the state of scirrhus, and before any kind of matter is formed. Such glands are sometimes not affected for years after the existence of the disease ; a circumstance that seems inconsistent with the penetrating and irritating qualities of this supposed virus. Some surgeons have even thought it unnecessury to remove the axillary glands, when they are diseased, together with a breast: an opinion, that I would recommend for the consideration of the operative surgeon. But, whether this idea is true, or not, the swelling of such glands may certainly sometimes be the effect of irritation, or sympathy, and not of an absorbed virus. This is the sentiment supported in Desault's works. Were it true, that all the symptoms of a cancerous diathesis depended upon the impression of a cancerous virus on our organs, it must matter little, whether the poison originates in this or that part. How then does it happen, that cancer is more quickly fatal in some organs, than others? Cancers of the uterus and breast are of short duration, compared with those of the skin and cellular substance. There must be, then, an influence exercised by the diseased organ itself over the whole economy, independently of the absorption of the virus, supposing such a thing to happen. This influence is, in all probability, the sole cause of all the phenonema of a cancerous diathesis, and it seems to be proportioned to the importance of the organ, and its functions in the system. No one can question, that in some instances, women, reduced to a state of marasmus, have been lastingly cured by the removal of a cancerous breast.* Such facts overturn all the conjectures, respecting the effects of a cancerous virus circulating in the body.

Relapses cannot rationally be explained by such a doctrine; for, if a cancerous virus existed every where in the constitution, and produced a return of the disease, why is not cancer of other parts excited? Why also do secondary operations frequently succeed? Why likewise does the application of caustic to a livid fungous part of the wound, after the operation, sometimes completely prevent the threatened recurrence of the distemper? Is it not more reasonable to explain these facts, by concluding, that the parts in the vicinity of the cancerous affection, are, at the time of this latter being removed, already in a state of disorganization, undiscoverable by the most attentive and experienced eye.†

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* See a case of this kind related by Morgagni de Sedibus et Causis Morborum. Epist. 50. Art. 16. besides numerous others on record.

† See Mémoire, Renfermant quelques Vues générales sur le Cancer, par P. J. Roux, in Œuvres Chirurgicales de P. J. Desault, par X. Bichat. Tom. 3.

OF SCIRRHUS, OR CANCER, PREVIOUS TO ULCERATION.

A hard and painful glandular swelling, having a disposition to become cancer, says Richter,* is the common, but inadequate, and erroneus, definition of scirrhus. The disease is not regularly attended with swelling; sometimes scirrhous parts diminish in size, and shrink. Hardness is not a characteristic property; for, many tumours, which are not scirrhous, are exceedingly indurated. The disease is not always situated in a gland; it oftentimes attacks structures, which cannot be called glandular;† and hard glandular swellings are often seen, which do not partake of the nature of scirrhus. The disposition to cancer cannot be enumerated among the marks of scirrhus, since it is not discoverable till carcinoma has actually commenced. Its termination in open cancer is not an invariable occurrence; and other tumours become cancerous, to which no one would apply the term scirrhus.

We cannot but admire the discrimination with which Richter views this part of an abstruce pathological subject. We retire from the page, however, with unsatisfactory information; for, instead of learning, what peculiar features characterize scirrhus, we only collect, that certain symptoms sometimes attend it, sometimes do not attend it, and sometimes attend other diseases, so that they form no diagnostic criterion of the particular one under consideration.

The term scirrhus must undoubtedly have some definite meaning, when employed by scientific men. Unreflecting surgeons may use the word vaguely; and, perhaps, influenced by its etymological import, they may call an immense number of various morbid indurations scirrhus.

I have always considered scirrhus as a diseased hardness, in which there is a propensity to cancerous ulceration, and a greater backwardness to recede, than exists in any other kind of diseased hardness, although the skin may occasionally not break during life, and a few scirrhous indurations may have been lessened.

Though Richter states, that this disposition cannot be discovered till carcinoma has actually taken place; though Messrs. Burns* and Home† confirm, that other indurations and tumors may terminate in cancer; though Mr. Abernethy‡ shews, that sarcomatous and encysted tumors may end in most malignant diseases, and such as are as bad as cancer; yet it is now well ascertained, that, in all these instances, the changes, which precede cancerous ulceration, bear no similitude to the genuine scirrhus.

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* Anfangsgr. der Wundarzneykunst, Band. 1. p. 260. edit. 3.

† "Muscular and membranous parts I have known to be affected with scirrhus, as well as those which are strictly glandular. A fatty membrane I have seen affected with the same disease." Dr. Baillie in a letter to Dr. Adams. See Observ. on the Cancerous Breast, by the latter, p. 34.

The puckering of the skin, the dull leaden colour of the integuments, the knotted and uneven feel of the disease, the occasional darting pains in the part, its fixed attachment to the skin above, and muscles beneath,|| form so striking an assemblage of symptoms, that, when they are all present, there cannot be the smallest doubt, that the tumour is a scirrhus, and that the disease is about to acquire, if it has not already acquired, the power of contaminating the surrounding parts, and the lymphatic glands, to which the absorbents of the diseased part tend.

But, it is not to be denied, that the diagnosis is frequently more obscure. In some cases, scirrhus is moveable, and not fixed to the subjacent parts; and the disease may be indolent, without much pain, or without discolouration of the skin. In the female breast, the part first affected may be very small, and feel like a loose pea under the skin; in other instances, it may be more extensive and deeply situated. Neither is the swelling always irregular and craggy: a late writer describes it, as being generally roundish and renitent. He describes the skin, at an advanced period, as being smooth and shining, and having a reddish hue, inclining to purple. He tells us also, that an external strongly marked cancer, when much distended, and tending to ulceration, but, not actually ulcerated, may be compared with a hard, prominent carbuncle, before it sloughs; for they have each a similar hardness, with a shining prominence; and if the cancer is adherent to a broad base, there is posteriorly a similar firmness and immobility.§

The progress of a scirrhus, before ulceration takes place, is generally slow; but, when this last process commences, the

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* Dissertations on Inflammation, vol. 2.

† Observations on Cancer, case 1 and 2, and p. 145—148, &c.

‡ Classification of Tumors, vol. 2, of his Surgical Works.

|| In advanced cases of cancer in the breast, the disease is frequently not only adherent to the pectoralis major, and intercostal muscles, but even to the ribs. See Howard's Pract. Obs. p. 18.

§ Howard, Practical Obs. on Cancer, p. 19 and 22.

ravages of the disease mostly spread with great rapidity. Sometimes, instead of absolute ulceration, an exudation occurs upon the skin, followed by an excoriation and scab. Mr. Howard attaches much importance to the preservation of this kind of scab, as it seems to defend the part for a time from further ulceration, and, thereby, serves to prolong the patient's existence.*

CHARACTERS BY WHICH SCIRRHUS MAY BE DISTINGUISHED FROM OTHER DISEASES.

A scirrhous induration is not prone to acquire the magnitude, which almost all other tumors are apt to attain, when their growth is not interrupted.

Other tumors are commonly more moveable, than scirrhous ones, especially, when they have not been inflamed.

If we except the fungus hæmatodes, other tumors do not involve every kind of structure, skin, muscle, cellular substance, &c. and the integuments seldom become affected before the distention, produced by the size of such swellings, becomes very considerable. In scirrhous cases, the skin soon becomes contaminated, discoloured, and puckered.

Some few tumors may be harder and heavier, than a few scirrhous ones; but, the reverse is commonly the case.

In a scirrhus of the breast, the part affected is generally hard, heavy, and connected with the mammary gland; and, when moved, the whole gland moves along with it.†

As other indurations and tumors may assume the cancerous action, and even end in cancerous ulceration; and as some true scirrhi, when not irritated by improper treatment, may continue stationary for years; the occurrence of actual carcinoma cannot prove, that the preceding state was that of scirrhus. The only criterion of the latter disease, which we possess, is deduced from the assemblage of characters already specified; for, except the peculiar puckering, and speedy leaden discolouration, of the skin, no other appearances, considered separately, form any line of discrimination.

In parts, which have become scirrhous, the structure usually consists of a very firm light brown substance, intersected by membranous, or ligamentous septa, which run in various directions. The membranous septa are more numerous, and of greater thickness, in some cases, than others. There is occasionally mixed with this structure a cartilaginous substance. The whole structure sometimes resembles very much a piece of common cartilage, softened by maceration in a dissolving fluid. Cysts, containing a serous fluid, are sometimes formed in scirrhi, particularly, those of the testicle and breast; but they are also frequently absent. A substance, possessing the common characters of a scirrhus, has been known to be converted into a kind of bony matter.* When a section of a scirrhus is made in an early stage, the centre is found more compact, harder to the feel, and of a more uniform texture, than the rest of the tumor, and is nearly of the consistence of cartilage. This middle part is not larger, than a silver penny; and from this are seen white ligamentous bands, passing to the circumference of the disease, in every direction, like rays. In the interstices, between these bands, the substance is different, and less compact away from the centre. Transverse ligamentous bands, of a fainter appearance, are likewise perceptible, forming a sort of net-work, in the meshes of which, the new-formed substance is enclosed.

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* Howard, Practical Obs. on Cancer, p. 19.

† Obs. on Cancer by E. Home, p. 156.

When the disease is more advanced, the whole mass has a more uniform structure; no central point can be distinguished; the external edge is more defined; and the ligamentous bands are more visible, running with great irregularity.

When the disease has proceeded to cancerous suppuration, which, however, does not invariably precede the formation of an outward sore, a small irregular cavity is found, filled with a bloody fluid, and having ulcerated, jagged, and spongy sides. Beyond these, there is a radiated appearance of ligamentous bands; but, the tumor near the circumference, is more compact, and consists of distinct portions, each of which has a centre, surrounded by ligamentous bands, in concentric circles.

In some instances, there is no appearance of suppuration, or ulceration, in the centre of a scirrhus; but, a cyst is found filled with a transparent fluid, and having a fungus projecting into the cavity.†

The most characteristic mark of a scirrhus is this intersection of its structure with white ligamentous bands. It is to be regretted, that the existence of such texture cannot be detected till the disease has been removed. Every surgeon should be well apprised, that these membranous septa frequently extend a good way into the surrounding fat; for, the circumstance dictates, in the strongest manner, the propriety of removing a considerable portion of the substance at the circumference of every scirrhous swelling.

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* Dr. Baillie in a letter inserted in Adam's work on the Cancerous Breast.

† Home, p. 157—159.

Sometimes cysts, of moderate, or very minute sizes, containing a transparent fluid, and supposed by Dr. Adams to be hydatids, are found in the substance of scirrhi; but, they are not so frequently attendant on the complaint, as to form any essential part of its character.*

The superficial veins are usually very much dilated.

OF CANCER IN THE STATE OF ULCERATION.

The diseased skin, covering a carcinomatous tumor, generally ulcerates before the swelling has attained any great magnitude. A large chasm is then produced in its substance, partly by a sloughing, and partly by an ulcerating process. A copious discharge of very fetid, sanious matter follows. The ulcer becomes irregular in its figure, and unequal on its surface. The edges are thick, indurated, and extremely painful; they often exhibit a serrated appearance, being sometimes retorted, at other times inverted. The ulcer sometimes spreads with rapidity to a great extent, and its progress produces frequent hemorrhages, which, joined with the irritation of the disease, reduce the patient to the lowest state of debility. Granulations generally grow on the ulcerated surface, when the ravages of the disorder seem to undergo a temporary stop; but, this apparent attempt at reparation only ends in the formation of an inveterate fungous substance.

While the skin remains entire, without ulceration, the health is, in general, not much impaired, unless the tumor is very large, and the distention great. During the progress of the disease, some patients suffer distressing attacks of sickness and vomiting, with symptoms of indigestion. As soon as ulceration of a scirrhous breast happens, the alteration of the health is, in many cases, immediate. But this sudden change does not constantly happen, much depending on the quickness or slowness of the disease, its magnitude, &c. However, sooner or later, in every case, after ulceration has taken place, the countenance changes for the worse; debility, loss of appetite, a cough, with tightness of the chest, and difficulty of breathing, come on; the bowels are sometimes constipated, sometimes relaxed; and very distressing sickness and vomiting affect many patients, who, at length sink into the extreme state of emaciation and weakness.†

The time, when the lymphatic glands become affected, is subject to great variety. Carcinoma of the breast is most apt to contaminate the axillary glands, and the disease, in these last, sometimes causes a swelling of the whole arm. Occasionally, the lymphatic glands towards the clavicle are the only ones affected; and, in a few instances, those towards the sternum are alone diseased. In advanced cases, the disease mostly extends to the pectoral muscle. There are instances, in which the cancerous disease of the breast extended to the lungs. The pressure of a diseased lymphatic gland on one of the axillary nerves has been observed to cause most excruciating agony. A fever has been known to occasion a mortification of a cancerous breast, and, had the sphacelus embraced all the contaminated parts, and the patient been less reduced, it seems probable, that a cure might have followed this event.*

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* Home, p. 160.

† Howard, p. 25.

TREATMENT OF SCIRRHUS AND ULCERATED CANCER.

The treatment of scirrhus embraces two objects, the dispersion, and the removal of the tumor. When the hardness is so situated, as to be easily removed by the knife, no delay should be occasioned by attempting to disperse a swelling of this nature. The operation ought to be performed early, as the chance of effectual extirpation is then greatest. On the other hand, the attempts at dispersion rarely succeed: the means employed are tedious in their operation, often injure the health, and when of an irritating nature, and incautiously applied, convert the scirrhus into a cancer. Prudence will only allow the operation to be postponed, and discutient remedies tried, when the hardness is below it usual degree, when the pain of the disease is not so great as to denote its tendency to ulcerate, and spread with rapidity; and when the swelling, induration, &c. have already seemed prone to diminish.

The internal plans of treatment, ordinarily tried, consist in giving some of the following medicines, together with a light fluid diet; cicuta, belladonna, digitalis, preparations of mercury, arsenic, tinct. ferri mur.; muriate of barytes; or the mineral alkali.

Living altogether on milk, or on a regimen just sufficient to support life, has been found to retard the malady. Vegetables for food, and distilled water for drink, have also been represented as productive of good effects.† Justamond was strongly in favour of arsenical medicines. Carmichael has praised various preparations of iron, as the carbonate, oxyphosphate, suboxyphosphate, &c. from thirty to sixty grains, in the day, aloes being given to obviate the constipation arising from such medicines.

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* For cases proving the foregoing statements, see Obs. on Cancer by E. Home, pages 55, 59, 64, 76, 86, 91.

† Reports on the Effects of a peculiar Regimen on Scirrhous Tumors, &c. by W. Lambe, M. D.

In all cases of cancer, severe pain is to be moderated by opium, and the bowels should be kept in a regular state with occasional saline purges.

Electricity, and a course of emetics, have been recommended by respectable practitioners. The aq. laurocerasi, in the dose of thirty or forty drops, has also been found serviceable.

Retaining a scirrhus in an equal temperature, and defending it from external irritation, by means of a piece of swan's down, or rabbit's skin, cannot be too highly commended, as a general plan.

In some instances, local applications, containing cicuta and belladonna, have done good: indeed these are the most safe remedies of the kind; for mercury, gum ammoniac, and several others, occasionally employed, are dangerous, because too irritating.

But, it is not to be denied, that tumors, somewhat resembling cancers, in the breast, have been dispersed, by the external use of spirit of wine, camphor, and Goulard's extract of lead, in different proportions, as well as by mercurial ointment of different degrees of strength.* Repeated bleeding with leeches is said to be often of service.† Tumors, arising from cold, yield most readily to this method; while those, which are more indolent, and connected with a languid constitution, give way to hemlock, or mercury.‡

A solution of the sulphate of iron (ʒj to ℔j of water) has been commended by Mr. Carmichael, as an application to scirrhi.

Knowing, as we do, the structure and inveterate nature of real scirrhi, we are obliged to regard every alledged instance of cure by internal or external remedies, as having in reality been another kind of disease. Applying caustics may, indeed, have cured cancerous diseases; but, then this was by extirpation and not by any medicinal effect. I may lay it down as a maxim, that, as soon as a malady is ascertained to be a scirrhus, the earlier its extirpation is attempted the better. Even when the diseased part appears to be adherent and immoveable, its removal is not contraindicated, if all the contaminated parts can be taken away.

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* Home, p. 154. † Howard, p. 25. ‡ Home, loco citato.

I shall say nothing of extirpating cancers with caustic, a method so inferior to excision.

The best mode of removing a scirrhous tumor is with the knife. The operation will be described in the chapter which treats of the extirpation of a diseased breast.

Even when a cancer has proceeded to ulceration, if the disease is not too extensive, and the patient not too much reduced, the operation ought to be practised without delay. If it is too late, the treatment can only be palliative, and some of the above remedies must be prescribed.

The most common external applications are preparations of lead, arsenic, solutions of iron, or of the hydrarg. mur. the carrot or fermenting poultice, pure oil, and the carbonate, arseniate, phosphate, &c. of iron, made into a paste with water.*

The operation itself may prove an exciting cause of carcinoma, and will certainly be so, if the scirrhous part is not completely removed. The portion left behind will inevitably become cancerous. The chance of success depends on the entire extirpation of the disease; and, in no operation, is celerity more dangerous. In performing this operation, the maxim of *sat cito, si sat bene,* should never be out of the surgeon's mind. Above all things, a free removal of the skin, covering and adjoining the situation of the tumor, and taking away a quantity of the surrounding fat, are advisable.

Even when the disease has to all appearances been most completely cut out, together with a large portion of the surrounding substance, the wound sometimes changes into a cancerous ulcer; and every prudent surgeon, therefore, always ensures his own reputation, by making a guarded prognosis.

With a view to the prevention of relapses, Mr. Abernethy strongly urges the propriety of endeavouring after the operation, to quiet the nervous system, and keep the digestive organs in as healthy a state as possible; and he recommends a mere vegetable diet, with as much milk, broth, and eggs, as is just sufficient to hinder the patient from losing strength.†

After the removal of a cluster of diseased glands from the axilla, a swelling of the arm has been known to ensue, and occasion the patient's death.‡

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* See Essays on Cancer, by J. Carmichael.

† See Abernethy's Surgical Works, vol. 2, p. 93, part 2.

‡ Home, p. 62.

CHAP. XXVIII.

GANGLIONS.

A GANGLION is a small hard tumor, unattended with pain, and composed of a cyst, which is of a firm tendinous texture, and contains a fluid resembling the white of an egg. It is usually moveable (in a greater or less degree) beneath the skin; its growth is slow, and it is seldom much larger, than a hazelnut. Its figure is commonly round, smooth, and even: it seldom inflames, and still more rarely does it suppurate; but, when the latter event happens, an ill-conditioned ulcer is generally produced.

Ganglions occur most frequently on the hands and fingers, and either over a tendon, or ligamentous expansion, with which the sac is connected underneath. But, there are instances of these tumors making their appearance in many other situations; and they sometimes attain a considerable magnitude. A ganglion has been known to cover the whole back part of the neck.* These tumors appear sometimes to be the consequence of a bruise, or violent sprain. Occasionally they move along with the tendon, to which they are attached; in other instances, they seem fixed.

Deformity, and impediment to the use of some particular muscle are the utmost inconveniences commonly resulting from this disease; but, when the tumor ulcerates, a very foul, and even dangerous, ulcer may be the result.†

TREATMENT.

The common plan of treating ganglions is to apply pressure, or stimulating applications, to them, with a view of causing them to be absorbed. Binding a piece of lead on a ganglion with a roller is a very good method. The oleum origani, or hartshorn, may be used as a liniment, when the stimulating plan is preferred. Mr. Warner found, that saponaceous liniments mixed with opium, and that plasters, composed of soap and mercury, had the greatest power in dispersing ganglions. He also mentions camphorated mercurial ointment, as having been successful.

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* Cases in Surgery, by Joseph Warner, p. 163, edit. 4.

† See Medical Journal, vol. 5.

No doubt, when ganglions are only attached to the subjacent parts by a slender pedicle, they might be as safely cut out as encysted tumors, if care were taken to leave no part of the sac behind. The disease, however, is not severe enough to induce most patients to submit to an operation, particularly, as the tumors may in general be greatly diminished, if not quite dispersed, by the preceding measures.

Supposing, however, all attempts to disperse a ganglion are ineffectual, and the parts are disabled, in consequence of the size and situation of the tumor, ought the surgeon to advise the extirpation of the disease? In my belief, it is his duty, in these circumstances, to recommend the operation. Admitting, that, in its performance, wounding the subjacent tendon, or ligament, cannot be avoided, daily experience proves, that accidental wounds of these parts commonly terminate well. The great object in the operation is to remove every particle of the cyst. That ganglions may be safely cut away, when they are obstinate and troublesome, is fully proved by numerous cases on record.*

Some writers mention a method of curing ganglions by striking them with a hammer, book, &c. so as to rupture the cyst, and cause the contents to be diffused in the adjacent cellular substance. I know a gentleman, who lately got rid of a ganglion in this manner, after trying in vain stimulating applications, pressure, &c. and many other instances of the success of the practice have been mentioned to me. Were it necessary to state any thing further in favour of this plan, I might add, that it is often adopted by Mr. Astley Cooper.†

I have seen several ganglions dispersed by keeping open a little blister over them. The application of caustic or setons to ganglions, cannot be too much censured, as being, of all methods, the most likely to change the complaint into an irritable fungous disease, or cancer-like affection, and when a cure happens to be affected by such means, it is always at the expence of unnecessary pain and trouble. Mr. Astley Cooper has sometimes adopted the plan of puncturing ganglions with a needle, and thus let out their contents, when other methods have failed, and he has never seen inflammation, nor any serious consequence excited by such practice.‡

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* See Warner's Cases, p. 165, 170, edit. 4. Gooche's Chirurgical Works, vol. 2, p. 376. Heister's Institutions of Surgery, part 2, chap. 171.

† See Medico-Chirurgical Transactions, vol. 2, p. 339.

‡ See this last work, loco citato.

CHAP. XXIX.

ANEURISMS.

I SHALL first present the reader with an account of the different kinds of aneurism, and their symptoms, as usually related in modern systems of surgery, and then take a little notice of the opinions advanced by the celebrated Scarpa.

When any part of an artery is preternaturally dilated, the tumor is named a *true aneurism.*

In such cases, the artery is either only enlarged at a small part of its track, and the tumor has a determinate border; or the vessel becomes dilated for a considerable length, in which circumstance, the swelling is oblong, and loses itself so gradually in the surrounding parts, that its margin cannot be exactly ascertained. The first case, which is the most common, is denominated the *circumscribed true aneurism;* the second is named the *diffused true aneurism.*

When blood escapes from a wound, or rupture, of an artery into the adjoining cellular substance, the swelling is termed a *false* aneurism.

In this instance, the blood either collects in one mass, distends the cellular substance, and converts it into a cyst, so as to form a plainly circumscribed tumor; or it is injected into all the cavities of the surrounding cellular substance, and extends along the course of the great vessels from one end of the limb to the other, thus producing an irregular oblong swelling. The first case is termed the *circumscribed false aneurism;* the second the *diffused false aneurism.*[*]

In cases of true aneurism, the coats of the diseased artery are found in a thickened, cartilaginous, and often ossified state. The vessel is either dilated at the whole of its circumference, or only on one side: the latter case sometimes happens, when the artery lies near a bone, which impedes the expansion of one side of the vessel.

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[*] The aneurism, supposed to proceed from a wound of the outer coat of the artery, and a dilatation of the internal ones, has been termed the *mixed;* but it is a case which has never existed elsewhere, than in the fancy. Authors are also not perfectly decided about the application of the term *mixed;* Monro applying it to cases, in which the artery is first dilated, and then ruptured.

The first thing which the patient perceives, is an unusual throbbing; and, on examination, he discovers a small pulsating tumor, which entirely vanishes, when pressure is made; but, immediately reappears when the pressure is taken off. It also spontaneously subsides, when the artery above it is compressed, and returns as soon as the compression no longer operates. It is free from pain; and the skin covering it is of its natural colour. When once the tumor has originated, it continually grows larger, and, at length, attains a very considerable volume. In proportion as it becomes larger, its pulsation becomes weaker; and, indeed, this is almost quite lost, when the disease has acquired much magnitude.

The diminution of the pulsation of the tumour is ascribable to several causes; 1. The arterial tunics lose their dilatable and elastic property in proportion as they become distended and indurated, and, consequently, the aneurismal sac is no longer capable of an alternate diastole and systole with the action of the heart; 2. Coagulated blood is deposited on the inner surface of the sac, particularly, in large aneurisms, in which some of the blood is always destitute of motion; 3. When the swelling is large, its pressure on the trunk of the artery sometimes has the effect of stopping the pulsation, and even of bringing about a spontaneous cure. In true aneurisms, the blood does not coagulate so soon, nor so frequently, as in false ones. When coagulated blood is present, pressure can only produce a partial disappearance of the swelling.

The larger the sac becomes, the more weakly does the blood flow into the continuation of the artery below the swelling, so that the pulse in the lower part of the limb is small and feeble, and the limb not so warm as it ought to be. But, in the majority of instances, except when the tumor is of vast size, the natural heat and vigorous circulation in the limb undergo only a transient diminution, just at the time when the flow of blood into the main artery beyond the swelling begins to be materially impeded: the anastomosing vessels soon enlarging, and transmitting the requisite supply of blood. On dissection, the lower portion of the artery is generally found preternaturally small and contracted. The pressure, made by the tumor on the veins and the adjacent parts, also frequently causes œdema, caries, &c.

The circumstance of large aneurisms being sometimes unattended with pulsation has occasioned their being mistaken for abscesses, and punctured. Pelletan records an example, where an axillary aneurism, which had no pulsatory motion, was opened on the supposition of its being a collection of matter. Scarlet blood gushed out; but, as the aperture was small, immediate death was prevented by the application of adhesive plaster.*

The greatest peril occurs, when the aneurismal sac bursts. The event may be foreseen by the part about to give way becoming particularly tense, elevated, thin, soft, and of a dark purple colour.

This state is followed by the formation of a little slough, which after a short time becomes loose, and the fatal hemorrhage follows. That this is the ordinary mode, in which aneurisms burst externally, may be ascertained by referring to the accounts delivered to us by the most accurate observers. I have seen the fact verified in one melancholy instance of subclavian aneurism, which burst in St. Bartholomew's hospital. This formation of a slough is noticed by Pelletan.†

At first, internal true aneurisms are only discoverable by an unusual and incessant throbbing in particular situations; but, after such tumors have acquired an immense size, they protrude externally, and then their nature is easily detected.

As all the arteries partake of the same structure, they are all subject to the true aneurism; but, as it occurs more frequently in the large, than the small arteries, it is evident, that the impetus of the blood must frequently have a considerable share in its origin. True aneurisms, as Monro justly thought, occur as often in the aorta, particularly, its arch, as in all the other arteries together. They frequently occur in the ham, and where-ever the arteries run unsurrounded by muscles, and are most exposed to external violence.

It very frequently happens, that patients have several aneurisms at the same time. I have seen patients, who either had more aneurisms than one, at the same time, or who had had other aneurismal tumors before those which I had the opportunity of observing. A most remarkable example of a multiplicity of aneurisms, however, is mentioned by Pelletan; he counted in one subject, not less than sixty-three aneurismal swellings, from the size of a filbert, to half that of a hen's egg.‡ Many cases might be quoted, where the patient was afflicted at once with more aneurisms than one.§ Sometimes the artery is diseased for a considerable extent from each tumor. In this, and, probably, in many other instances, aneurisms are the consequences of a morbid affection of the whole arterial system. We may infer this from the disease frequently originating spontaneously, without any assignable local cause; and from frequently finding, in aneurismal subjects, various arteries studded with white, cartilaginous, or osseous specks.

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* Clinique Chirurgicale, tom. 2, p. 84.

† Same work, tom. 2, p. 91.

‡ Same work, tom. 2, p. 1.

§ See in particular London Med. Review, vol. 1, p. 420.

The experiments, made on animals, by Hunter and Home, have decidedly proved, that a mere local weakness of a part of an artery will not occasion the formation of an aneurism. These surgeons have shewn, that even dissecting off the outer coats of an artery will not cause this effect.* How erroneous then, must the opinion be, that a mixed aneurism ever arises from a prick of the outer tunic of vessels, and a consequent dilatation of the inner coats.

The *false aneurism* is always owing to an aperture in an artery, from which the blood gushes into the cellular substance, in the manner already explained. A sudden and violent strain may lacerate an artery, and cause this disease; or a wound may give rise to it. The false aneurism most frequently occurs at the bend of the arm, in consequence of the brachial artery being accidentally wounded in phlebotomy.

When the artery is thus wounded, the surgeon endeavours to stop the hemorrhage by pressure, which may occasion a diffused aneurism, in consequence of the external aperture being closed, so that the blood can no longer escape, and must necessarily insinuate itself into the cellular substance. The swelling thus created is uneven, more or less prominent, and extends upward and downward along the course of the artery. The skin covering it is of a dark purple colour.

Such is the origin of the *diffused false aneurism*. It increases in size as long as the internal bleeding continues; and, if this has not a timely stop put to it, the case excites violent pain, deprives the member of the power of motion, and causes inflammation and gangrenous mischief.

The *circumscribed false aneurism* arises in the following manner: when proper pressure has been made in the first instance, so as to suppress the hemorrhage, but the bandage has afterwards been removed too soon, or before the artery has healed, the blood passes through the unclosed wound, or that which it has burst open again, into the cellular substance. As this has now become agglutinated by the preceding pressure, the blood cannot diffuse itself into its cells; and, consequently, a mass of it collects in the vicinity of the aperture of the artery, and distends the cellular substance into a sac.

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* See Trans. of a Society for the Improvement of Med. and Chirurgical Knowledge, vol. 1, art. 9.

Sometimes, when the aperture of the artery is exceedingly small, the blood first effused coagulates; the entrance of any more into the cavities of the cellular substance is prevented, and whatever escapes from the vessel collects in one mass.

The symptoms of a circumscribed false aneurism do not differ very much from those of a circumscribed true one. But the two cases are said to be in general easily discriminated. The true aneurism readily yields to pressure, and as readily recurs on its removal; the false one yields very gradually, and returns in the same way. The blood in the sac can only pass and repass slowly through the opening of the artery. Frequently, also, a hissing sound is very audible, as the blood gushes into the sac again. The pulsation of the false aneurism is always more feeble, and, as the tumor enlarges, is lost sooner, than that of the true aneurism. In consequence of coagulated blood lodging in false aneurisms much sooner than in true ones, the former become hard, and incapable of disappearing on pressure, much sooner than the latter. The diffused false aneurism has little or no pulsation, except very near the aperture of the artery.

When the artery is wounded at the bend of the arm, the mode of applying pressure has been already described in the chapter on hemorrhage.

Even when a circumscribed false aneurism has originated, compression is still applicable as long as the swelling is soft, and can be pressed away. A tourniquet is first to be applied to the upper part of the arm, the blood is then to be pressed back into the artery, and pressure employed. But, in case there is a great deal of coagulated blood in the aneurismal sac, and the tumor is incapable of disappearing on pressure, compression is not likely to be of service. The coagulated blood, situated over the aperture of the vessel, prevents the pressure from operating with sufficient efficacy. However, when the quantity of coagulated blood is trivial, a trial of pressure may be made. Sometimes it succeeds; and should it not, still it is productive of some benefit; because, while it more or less obstructs the flow of blood through the main artery, it obliges this fluid to pass into the collateral branches, which then become dilated, and thus fitted for transmitting an adequate supply of blood into the limb, when the arterial trunk is tied.

Scarpa maintains, that the grand distinction of aneurisms into true and false ones, is not founded in reality. He states, that, after a very considerable number of investigations, instituted upon the bodies of persons, who have died of internal or external aneurisms, he has ascertained in the most certain and unequivocal manner, that there is only one kind, or form of this disease, viz. that caused by a solution of continuity, or rupture of the proper coats of the artery, with effusion of blood into the surrounding cellular substance. Scarpa observes, 'that this solution of continuity may be occasioned by a wound, a steatomatous earthy degeneration, a corroding ulcer, or a rupture of the internal and muscular coats of the artery. His doctrine also tends to deny, that any preternatural dilatation of these coats is essential to the formation of the disease; and, he contends, that every aneurism, whether it be internal, or external, circumscribed, or diffused, is always formed by effusion. Scarpa, of course, maintains, that the aneurismal sac is always composed of the cellular sheath surrounding the artery. He says, that the place of the rupture in the coats of the vessel is capable of being demonstrated by dissections, and he supports his arguments by quoting many distinguished ancient writers, who considered aneurisms as being formed by effusion.*

For my own part, I see such accuracy in the whole of Scarpa's account, that I am inclined to adopt his opinions respecting the formation of aneurism, and the variety in the symptoms must be imputed to the case being circumscribed or diffused, &c.

The fact, that the origin of numerous aneurisms can be traced to causes capable of lacerating the artery, is strongly in support of Scarpa's opinions. Most of the interesting cases, recently published by Pelletan, arose from such causes. In this gentleman's work, we find relations of aneurisms, which arose from violent efforts, forcible pressure on arteries, reiterated bruising of parts, the force employed in reducing a dislocated humerus, falls, fractures, wounds, &c.† We are not, however, to suppose that all cases of aneurism originate from a breach in a sound artery: in most instances, a morbid change of the coats of the vessel precedes the actual solution of continuity in it.

The *venous aneurism*, or *aneurismal varix*, is the only one remaining to be described. Sometimes in bleeding, the lancet quite transfixes the vein, and enters the subjacent brachial artery. The external wound of the vein heals; but, the internal one being prevented from doing so, by the flow of arterial blood into the vein, the latter soon becomes dilated in the situation over the preternatural communication between the two vessels. Besides the dilatation a tremulous motion, and a pulsation in the vein occur, attended with a hissing noise, arising from the gushing of the blood into the vessel from the artery. This disease is not dangerous; and we have no instance of its attaining any considerable size, or requiring an operation. The nature of this case was first explained by Dr. W. Hunter,* though, indeed, Guattani published two examples of the affection, about the time when this gentleman's account appeared.†

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* See A Treatise on the Anatomy, Pathology, and Surgical Treatment of Aneurism, by A. Scarpa, trans. by J. H. Wishart.

† Clinique Chirurgicale, tom. 1 and 2.

TREATMENT OF ANEURISMS.

Internal aneurisms have generally been considered beyond the reach of surgery. Debilitating remedies, abstinence, a milk diet, occasional bleedings, and the avoidance of all exertion, have been the means commonly recommended, rather with an expectation of retarding the disease, than of effecting a cure. The facts, however, which modern experience has adduced in favour of the efficacy of a treatment first proposed by the celebrated Valsalva, are certainly such as to justify a confident belief, that many internal aneurisms, even though large and much advanced, are capable of palliation, reduction, and cure. The cases recently published by M. Pelletan, surgeon to the Hotel Dieu, at Paris, furnish the most convincing evidence, that vast aneurisms of the aorta, so large as to project through the absorbed part of the ribs and sternum, may sometimes in a very moderate time be reduced and cured by Valsalva's method. This chiefly consists, in bleeding the patient largely and repeatedly; in allowing only the most spare diet, nothing in fact but broth and acid drinks; in applying ice, or compresses wet with a cold lotion of vinegar and water, to the swelling; and, lastly, in enjoining the strictest observance of silence and quietude. The quantity of blood that has been taken away in these cases is really astonishing: some of the patients, for the first few days of the treatment, having been bled several times a day. Besides aortic aneurisms, M. Pelletan effected the cure of a subclavian aneurism by pursuing Valsalva's treatment.‡

But, external aneurisms are the cases, in which the power and utility of surgery are strikingly displayed, and for which its aid is commonly demanded. With respect to these cases, I must notice, that they do sometimes undergo a spontaneous cure, in consequence of the artery affected becoming impervious, and no longer communicating with the cavity of the aneurismal sac. This beneficial change may be the effect of the pressure of the swelling itself on the vessel. It is sometimes produced by the skilful employment of compression. But, there is another mode, in which a spontaneous cure of external aneurisms sometimes happens: When the tumor has become large and tense, it suddenly falls into an inflamed and gangrenous state, and the inflammation extending its effects to a sufficient depth, the artery, where it communicates with the aneurismal sac, is rendered impervious. At length, the mortified parts, together with the mass of blood in the tumor, are cast off, and, if the patient's constitution holds out, a cure ensues. I have known an instance of an axillary aneurism getting well spontaneously without any inflammation, or sloughing. I have seen an inguinal aneurism, under Mr. Albert, get well by the tumor mortifying, and the inflammation extending to the artery. Whenever the sloughing and inflammation are only superficial, and confined to the skin and sac, the patient bleeds to death on the detachment of the mortified part. But, notwithstanding some patients are fortunate enough to have a spontaneous cure, this event is too rare to sanction much expectation of it, or to justify a surgeon in withholding his assistance.

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* See Medical Observations and Inquiries, vol. 1 and 2.

† De Cubiti flexuræ aneurysm. obs. 3, 4.

‡ See Clinique Chirurgicale, par P. J. Pelletan, tom. 1, Mem. Sur les Aneurismes Internes. Paris, 1810.

Setting out of the question Valsalva's method, the ordinary principle, on which aneurisms are cured, consists in preventing the entrance of fresh blood into the aneurismal sac; for, when this is effectually accomplished, the blood, already contained in the sac, is gradually absorbed, and the tumor diminishes in proportion.

This object, as I have observed, may sometimes be fulfilled by a skilful application of pressure, particularly, if the aneurism is small, and the whole of its contents can be made to recede. However, though it is generally proper to try pressure in the early stage of the disease, it cannot be said, that such practice is attended with much success. If the communication, between the aneurismal sac and artery, does not become obliterated in consequence of this means before the end of a fortnight, there is no great reason to expect, that it will do so in a longer time. The instances, recorded of aneurisms being cured by a long perseverance in pressure, are probably cases which would naturally have got well without this means.

MODE OF OPERATING FOR THE POPLITEAL ANEURISM.

The operation, for the cure of popliteal aneurisms, consists in exposing the femoral artery about the middle of the thigh, and putting a ligature round the vessel. It is preferable to tie the artery at this distance from the tumor, because the vessel is very frequently in a morbid state higher up than the visible swelling would lead us to conjecture. We are indebted to Mr. John

Hunter for this method of operating.* The plan, however, has undergone considerable improvements since his time; and of all surgeons, who have exerted their abilities in the achievement of this object, no one has been so successful as Mr. Abernethy. This gentleman soon perceived that the occurrence of hemorrhage, after tying an artery, did not commonly originate from the mechanical bursting of the vessel, or from the ligature becoming lax, and changing its situation, but from ulceration of the artery. The blood-vessels are themselves vascular, and derive their supply of nourishment from vessels transmitted to them from the surrounding substance. How proper must it therefore be to apply a ligature round an artery as near as possible to where it lies involved in its natural connexions! In this situation, the ligature is much more likely to produce an adhesion of the sides of the vessel to each other, and the danger of ulceration is less, than if it were applied, as was formerly done, to the middle of the exposed portion of the artery, where the vessel has been quite separated from its connexions by the passage of the surgeon's finger underneath it. In short, Mr. Abernethy's mode of operating consists in making an incision about two inches and a half† in length through the skin and fascia of the thigh, on the inner edge of the sartorius muscle; as soon as the femoral artery is felt, an incision is to be made on each side of it, in order to enable the operator to pass his finger beneath it; and, lastly, a double ligature is to be introduced by means of a blunt needle under the vessel, observing to leave out the femoral vein, and accompanying branches of the anterior crural nerve. One portion of the ligature is to be tied as high, the other as low, as the detachment of the artery will allow, and with sufficient tightness to cut through the inner coats of the vessel. The part of the vessel, between the two ligatures, is then to be divided. Thus the two ends of the artery will be in the same state as those on the surface of a stump after amputation.‡

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* See Trans. of a Society for the Improvement of Med. and Chirurgical Knowledge, vol. 1, art. 9.

† The many opportunities, which I have had of seeing this operation performed, have strongly impressed me with the propriety of making the external incision larger, than is usually done. A small wound in the skin embarrasses the operator exceedingly, because it materially obstructs him in his main design, which is to get a ligature under the artery. The patient suffers far more pain, than if the external wound had been made somewhat more than three inches long; the operation is rendered tedious; and, what is worse, the artery and the wound are seriously irritated and disturbed.

‡ See Abernethy's Surgical Works, vol. 1, p. 227, &c.

The limb, if cold after the operation, may be covered with flannel and gently rubbed.

Dr. Jones's experiments on animals shew, that if the ligature were merely applied tightly round an artery, and immediately afterwards taken off, the vessel would become impervious at the part, in consequence of the internal coats being cut through, and the subsequent effusion of lymph.*

What I consider as the most valuable practical remark in all Scarpa's work, is the advice to make the incision in the upper third of the thigh, or a little higher, than the situation, which Hunter chose. His reasons for this are, to avoid the necessity of removing the sartorius muscle too much from its position, or of turning it back, for the purpose of exposing the artery and tying it. The best operators, even professed anatomists, are frequently embarrassed by having the sartorius immediately in their way, after they cut through the skin. Also as the artery is more superficial higher up, and less likely to be in a morbid state, because further from the disease, there is every consideration in favour of this part of Scarpa's practice.

I shall not notice any mechanical contrivances to prevent the ligature from slipping off the vessel, because I consider them pernicious, for reasons explained in the chapter on hemorrhage. What power can possibly drag the ligature off the artery? In short, hemorrhage may be said to be always produced by ulceration, except in a few instances, in which the ligature comes away after remaining applied the usual time, but still the sides of the vessel have not grown together, from causes which Dr. Jones has explained in his valuable work on hemorrhage.

MODE OF OPERATING FOR FEMORAL ANEURISMS FAR UP THE LIMB.

Mr. Abernethy has rendered surgeons more confident in the success of operations for popliteal aneurisms by his bold, yet judicious attempts to cure aneurisms situated in the groin. Four times has he tied the external iliac artery, and established the fact, that the inosculations, even in such a high situation as this, are quite sufficient for conveying a due quantity of blood into the limb below. By the last attempt, he preserved the life of a person, who, without an operation, would certainly have been in the grave in a very short time by the rupture of the tumor. Similar operations have since been performed with the most successful consequences by Mr. Freer and Mr. Tomlinson, of Birmingham, and Mr. Astley Cooper.*

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* See a Treatise on the Process employed by Nature, in suppressing Hemorrhage, &c. by J. F. D. Jones, M. D. 1805. The above remarkable effect of the ligature, has lately been exemplified on the external iliac artery in the human subject. See London Medical Review, vol. 3, p. 340.

The plan of doing it is simple, and consists in making an incision, about three inches in length, through the integuments of the abdomen, a little above Poupart's ligament, and half an inch on the outside of the abdominal ring, in order to avoid the epigastric artery. The aponeurosis of the external oblique muscle is then to be divided in the direction of the wound. The lower margin of the internal oblique and transverse muscles is also to be cut with a crooked bistoury. The finger may then be passed under the peritoneum, by the side of the psoas muscle, so as to touch the artery. A double ligature is to be carried under the vessel, and tied as in the operation for the popliteal aneurism, tightly enough to divide the inner coats of the artery.

The several operations, in which the external iliac artery has been tied, all tend to prove how sure the limb is of having an adequate supply of blood through the anastomosing vessels. The cases might almost warrant the conclusion, that the limb is in no more danger of mortifying on this account, when the artery is tied above Poupart's ligament, than when tied low down in the thigh. No doubt, still greater success would follow such operations, if they were generally undertaken at an earlier period, before the tumors have become very large, and the health impaired by confinement. The fact, that the anastomoses are always fully adequate to carry on the circulation in the limb, being now well established, there is no excuse for delaying the operation, for the purpose of affording time for the dilatation of the anastomosing vessels.

MODE OF OPERATING FOR ANEURISMS AT THE BEND OF THE ARM.

Surgeons used always, until very lately, to deem it indispensably necessary, in operating for aneurisms of the brachial artery, to tie the vessel, both above, and below the swelling. They thought, that one ligature above would not be sufficient, by reason of the freedom, with which the blood would get into the sac, through the inosculations between the collateral and recurrent arteries. Scarpa, however, has explained, that one ligature above the tumor is quite enough. An incision is to be made along the inner edge of the biceps muscle, the sheath of the artery opened, and the vessel, after being separated from the median nerve and vein, tied with due firmness.

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* I find not less than four cases recorded, in which the external iliac artery has been tied in Guy's Hospital. All these instances were followed by a cure, though, in two of them, mortification had begun in the tumors before the operation. Mr. Astley Cooper has likewise performed the same operation, for the cure of an inguinal aneurism, on a gentleman, who got well so speedily, that he attended the Exchange five weeks after the artery had been taken up. See London Med. Review, vol. 2, p. 399, and vol. 4, p. 287. The operation has also now been done with success at Dublin and Philadelphia.

When the aneurism of the brachial artery is diffused, and attended with violent pain, and inflammation, Scarpa advises the old operation of opening the tumor, taking out the coagulated blood, and tying the artery with two ligatures, one above, the other below, the opening in the vessel.

The propriety of this practice seems to me very questionable.

MODES OF OPERATING FOR AXILLARY ANEURISMS.

The sufficiency of the anastomosing vessels for the transmission of the blood, when a large arterial trunk is tied, appears now to have been exemplified in every situation, where the performance of such an operation is at all practicable. Not only may the external iliac artery be tied, without the circulation in the lower extremity being cut off, the subclavian artery at the point, where it first emerges from the chest, may also be tied, and yet the arm receive an adequate supply of blood. Were it not for these well established facts, patients with wounds and aneurisms of the axillary artery must be left to their fate.

In January, 1795, Desault was called to a man, whose axillary artery had been wounded with a small sword. The external opening made by the weapon being small, the patient did not immediately bleed to death; but, a large false aneurism arose, attended with occasional hemorrhages. Febrile symptoms came on, and the pain in the part was very great. On the fourth day, the forearm became cold and of a yellowish hue, and the suffering was so great as to threaten to induce convulsions. Fresh bleeding took place; the swelling grew larger, red, and tense; and an obscure pulsation was perceptible.

Desault caused the axillary artery to be compressed against the first rib, on the outside of the sterno-cleido-mastoideus, from above the clavicle. He then made an incision six inches long, from the external third of the clavicle in the direction downwards and outwards. Two large branches of the thoracic artery, divided by this cut, were immediately tied. By a second incision, Desault divided the two lower thirds of the pectoralis major, the bistoury being guided on a director. A vast quantity of blood now gushed out. Desault instantly put his fingers on the artery, and with the aid of a kind of needle, to which the reader's attention will presently be requested, he passed a ligature at once under the vessel and axillary plexus of nerves. By means of this first ligature, the hemorrhage was stopped for a time, and the artery drawn a little out so as to be more visible. The vessel was then separated from the nerves, and ligatures (on each side of the opening in it) applied, with the aid of the particular needle, used by Desault for conveying ligatures under vessels deeply lodged, and termed by the French, *l'aiguille à ressort.*

These are all the essential circumstances which need here be mentioned, in regard to the mode of operating. The extravasated blood was washed away, and the wound dressed, though, unfortunately not without being crammed with lint, instead of having its edges brought together. The first day after the operation afforded hopes of a cure; and the circulation in the forearm was returning;* but, a difficulty of breathing afterwards came on, the limb mortified, and the patient died on the sixth day. Doubtless, this patient would have had a much better chance of preservation, had the operation been performed earlier, before a tendency to mortification began in the arm, and had the wound been closed with sticking plaster, according to the most approved principles. At the same time, it must be confessed, that diffused false aneurisms are the most dangerous of all those, which admit of operations, particularly, when the arteries interested are of large size. The injection of an enormous quantity of blood into the cellular texture, proves both an impediment to the free circulation in the limb, and a frequent cause of gangrenous symptoms, in addition to the obstruction to the passage of the blood, through the main artery, occasioned by the ligature.

It appears, that Mr. Keate has also tied the axillary artery by cutting below the clavicle. The ligature, however, which was passed with a needle, did not include the vessel by itself, as is most desirable. This case, however, proved entirely successful.†

Mr. Pelletan, in 1786, had under his care a man, in the Hospice du Collége de Chirurgie at Paris, who was afflicted with an axillary aneurism, which had existed two years. The swelling occupied the whole axilla, advanced under the great pectoral muscle, and descended even below the nipple, while, behind, it pushed back the humerus, and appeared engaged under the front edge of the deltoid muscle. But, on the shoulder being raised, a considerable space was perceptible between the tumor and clavicle. The clear manner, in which the artery could be felt under this bone, when the shoulder was elevated, and the ease with which pressure on the vessel sufficed for stopping the pulsation of the swelling, seem to have induced Pelletan to think of operating. He was further encouraged by considering, that the branches, given off by the subclavian artery, were numerous, as well as their communications with the branches arising from the axillary and brachial trunks.

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* "Les veines du dos de la main, et de l'avant-bras charrioient du sang; nul doute que la circulation commença à se retablir." Œuvres Chir. de Desault par Bichat, tom. 2, p. 556.

† See Med. Review and Magazine for 1801.

Pelletan had made up his mind to divide the integuments below the clavicle the whole length of that bone, and, after passing a director under the clavicular portion of the pectoral muscle, to detach this part from the whole of its connexion with the preceding bone. Thus he intended to have exposed the axillary artery, so as to have been able to apply a ligature to it. Unfortunately, some other surgeons, called into consultation, objected to the project of dividing the pectoral muscle; and Pelletan was foiled, after making in vain a deep and hazardous thrust with the needle, in the hope of being able to include the artery. The patient was afterwards seized with inflammation and pain in his chest, and died on the twentieth day from the operation.*

In a periodical work,† I find brief mention made of another case, in which the subclavian was tied on account of an axillary aneurism. The mode of operating is not stated; the object is said to have been easily accomplished; but, the patient died on the fourth day, with symptoms of oppressed respiration.

On the whole, perhaps, the method adopted by Desault, is the safest, when the operation is to be attempted below the clavicle. There is another mode, however, which seems practicable.

An incision about three inches long, might be made through the integuments, a little below the clavicle, and immediately over the hollow between the deltoid and pectoral muscles. The axillary vein lies before the artery, and as a wound of it would probably be fatal, the utmost caution must be observed in the dissection. Care must also be taken not to mistake one of the cervical nerves for the artery. With an eye probe, a ligature is to be put under the vessel, as soon as it is distinctly ascertained to be such, and the vein and any adjacent nerve should be carefully excluded. No man ought to undertake this operation, who is not a steady operator, and is not well acquainted with the anatomy of the parts. If the aneurismal tumor, however, should extend far inward, toward the sternum, this plan of operating would not be practicable.

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* Clinique Chirurgicale, par P. J. Pelletan, tom. 2, p. 49.

† Lond. Med. Review, vol. 4, p. 288.

Thus far of the mode of tying the axillary artery by cutting below the clavicle. When the aneurismal tumor extends far inwards towards the sternum, the only place, where the subclavian artery can be taken up, is just where it emerges from the chest, from behind the anterior scalenus muscle, and the object can only be effected by cutting above the clavicle. On a dead subject, having no large aneurismal swelling, such an operation is much easier than on a living person, whose clavicle is pushed up by a vast tumor, so as to increase the distance, between the the artery and the wound in the skin. The most interesting example of this operation lately occurred in St. Bartholomew's Hospital. Mr. Ramsden made a transverse incision, about two inches and a half in length, along and upon the upper edge of the clavicle. The cut was begun on the side towards the shoulder, and ended about half an inch from the outer edge of the sterno-cleido-mastoideus muscle. This incision divided one small artery, which was immediately secured. The skin, above the clavicle, was then pinched up, and divided, from within outwards and upwards, in the line of the external edge of the sterno-cleido-mastoideus muscle, to the extent of two inches. The shoulder was now lowered, and the edge of the anterior scalenus muscle exposed. The artery was then distinctly felt, presenting itself from between the scaleni, and it was detached with the finger-nail, in order that the ligature might be passed round it. Here, some considerable difficulty arose, as Mr. Ramsden was not provided with any kind of aneurismal needle, that would allow their points to be brought up again, in the very short curvature, which the narrowness of the space, between the rib and the clavicle, afforded. Though the ligature could be conveyed under the artery, it could not be got round the vessel. At length, a probe of ductile metal was got under the artery, and, by this means, a ligature was drawn under the vessel. The usual knot was then made. This patient lived five days after the operation, and, on dissection, nothing but the artery was included in the ligature. This case fully proved, first, that the arm may be duly nourished with blood, and suffer no diminution of its temperature, though the subclavian artery is tied immediately it comes out of the chest. Secondly, it proved, that an artery so near the heart as the subclavian, may be rendered impervious by the ligature, as, on dissection, this vessel, where the cord was applied, was nearly divided through, while the two ends were found consolidated and closed.*

The judgment, that I formed from the observation of this case, was, that, in all probability, a complete cure would have taken place, had the man chanced to submit to the operation, before the tumor began to slough, and before his health was materially impaired; and had the operation itself been shortened and facilitated by the assistance of the needles represented in Mr. Ramsden's publication.

These instruments undoubtedly resemble, in principle, Desault's aiguille à ressort, which consisted of a silver sheath, one end of which was straight, and the other curved in a semi-circular way. This sheath enclosed an elastic wire, one end of which projected a little beyond the bent end of the sheath, and had a transverse eye in it, for the reception of the ligature. The instrument, being introduced under the artery, the sheath was kept fixed, while the elastic wire was pushed through it, till the transverse eye had ascended sufficiently to let the surgeon take hold of the ligature. This being disengaged from the instrument, the latter was withdrawn.† The needle, invented by Mr. Watts,‡ appears to me rather an improvement on Desault's, inasmuch as it is made to let loose the eye and ligature together, as soon as they are conveyed far enough round the artery; a contrivance likely to save some little trouble.

Aneurismal needles, made on the foregoing principles, must certainly afford great assistance to any future operator, who may attempt to tie the subclavian artery from above the clavicle, as they obviate the chief difficulty, namely, that of getting the ligature quite round the vessel.

It was this difficulty, which baffled Mr. Astley Cooper in one attempt, which was made some time since in Guy's Hospital.§

Nothing is more possible, than to mistake one of the cervical nerves for the subclavian artery, in consequence of the pulsation of this vessel being communicated to all the adjacent parts. I have seen a mistake of this kind actually made by very skilful surgeons.

Pelletan practised on the dead subject the following method: the head was turned to the opposite side, and the shoulder lowered as much as possible. An incision was then made along the neck, at the back of the sterno-cleido-mastoideus muscle, so as to bring into view the scaleni muscles. The anterior portion of these muscles being divided, a ligature was conveyed without difficulty under the subclavian artery, with the aid of an aneurismal needle, mounted on a handle, said by the French to have been invented by Deschamps.* With the exception of cutting the anterior scalenus, which seems unnecessary, Mr. Abernethy has demonstrated in his lectures a similar operation these many years past.

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* See Practical Observations on the Sclerocele, &c., by T. Ramsden, surgeon to Christ's Hospital, &c.

† See Œuvres Chirurgicales de Desault par Bichat, tom. 2, p. 560—561.

‡ See Plate 11.

§ See London Med. Review, vol. 2, p. 300.

OPERATION PROPOSED BY DESAULT IN CASES OF TRUE ANEURISM, WHERE A LIGATURE CANNOT BE APPLIED ABOVE THE TUMOR.

Before some of the facts, already noticed in this chapter, had been ascertained, inguinal and axillary aneurisms were deemed incurable by any surgical operation. Indeed, cases sometimes even now present themselves, in which, owing to the extent of the swelling, the boldest and most expert operator could not attempt to take up the artery in the ordinary method.

It was for such examples, that the great Desault proposed the scheme of cutting down to the artery, and tying it, immediately below the tumor. Desault conceived, that the circulation would then be carried on by the collateral vessels; that the blood in the aneurismal sac would coagulate, and in time be absorbed; and that the arterial tube would be obliterated from the ligature as high as the first collateral branch. Desault laid much stress on the prudence of sparing, in the operation, every anastomosing artery; of making only a small incision; and of only making the attempt in cases, where the sac and integuments were not too thin. The French surgeon Deschamps tried this operation for the cure of an inguinal aneurism, which, I may observe, would have admitted very well of the performance of Mr. Abernethy's more successful plan. The result of Deschamps's case was decidedly adverse to the efficacy of Desault's project, not so much on account of the patient's death, as because the aneurismal tumor afterwards continued to pulsate strongly, and underwent a more rapid enlargement. As for the patient's decease, I think it sufficiently accounted for by what he suffered in the two severe operations, to which he was subjected, and the loss of blood he sustained in the second one. The first was tedious, and by no means the simple operation, which Desault seemed to have had in contemplation.* The method, it is to be observed, however, is, in its principle, contrary to the ordinary plans, by which aneurisms are cured, and which essentially consist in stopping the current of blood into the aneurismal sac.

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* Clinique Chirurgicale, tom. 2, p. 86.

By Desault's project, the distention of the sac with blood was increased; and the changes hoped for, from the coagulation of this fluid, were altogether speculative, and, on the whole, unpromising.

I decidedly give my preference to Mr. Abernethy's practice, and, if the case were too advanced for this, would rather trust to the chance of a spontaneous cure.

OPERATIONS, IN WHICH THE CAROTID ARTERY HAS BEEN TIED FOR THE CURE OF ANEURISMS, &C.

That the carotid artery might become obliterated, without any dangerous effect on the brain, and that an aneurism of the same vessel might undergo a spontaneous cure, was long since proved by the case, related by Petit, who, on the patient's decease some time afterwards, found the right carotid obliterated from its bifurcation as far as the subclavian of the same side.† But, besides this kind of obliteration by a process of nature, modern experience has evinced, that the carotid artery may be suddenly tied with a ligature, and thus rendered impervious, without any pernicious consequences on the brain. In one instance, indeed, where Mr. Abernethy was obliged to take up the carotid artery, the head seemed to be affected; but, then, the patient had lost an almost fatal quantity of blood; and had an immense lacerated wound of the neck, in consequence of being gored with a cow's horn. Perhaps, therefore, it might be more correct to refer the affection of the brain to these causes, than to the ligature on the carotid artery. We may make such inference with tolerable certainty, since it has now been repeatedly proved, that tying this vessel, even in the most sudden manner, occasions no dangerous consequences on the brain. Hebenstreit mentions a case, which he had met with, where the external carotid was wounded in the extirpation of a tumor; and the patient would quickly have fallen a victim to the hemorrhage, had not the surgeon instantly tied the trunk of the artery. The operation succeeded, and the patient lived many years afterwards.* Mr. B. Travers, Demonstrator of Anatomy at Guy's Hospital, tied the carotid artery in a woman, who laboured under an aneurism by anastomosis in the left orbit, causing a protrusion of the eye from its socket, and attended with distracting head-achs. No alteration in the functions of the brain ensued; no hemorrhage arose on the separation of the ligatures; and the consequence was a cure of the tumor in the orbit, the violent pain in the head, and the exophthalmia.†

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* See Œuvres Chirurgicales de Desault, par Bichat, tom. 2, p. 568—580.

† Acad. R. des Sciences de Paris, an. 1765. See also a case of one carotid artery obliterated, and the other lessened in diameter, without apparent ill effects, as adverted to by Mr. A. Cooper, in the Medico-Chirurgical Trans. vol. 1, p. 223.

The most interesting example, in which the carotid was tied for the cure of an aneurism of this vessel, occurred in Guy's Hospital. The tumor was two inches and a half in diameter, was situated on the left side of the neck, and was accompanied with severe pain on the same side of the head. The swelling in some degree affected the speech and respiration, and the patient was troubled with occasional sickness, giddiness, and loss of sight. The aneurism was just below the angle of the jaw. Mr. A. Cooper, in the operation, began an incision opposite the middle of the thyroid cartilage, carrying the wound from the base of the tumor to within an inch of the clavicle, on the inner side of the mastoid muscle. On raising the margin of this muscle the omohyoideus was seen crossing the sheath of the vessels, and the nervus descendens noni was also exposed. Mr. A. Cooper next separated the mastoid from the omo-hyoideus muscle, and the jugular vein became apparent. The vein being drawn aside, the par vagum was seen, lying between that vessel and the carotid artery, a little on the outside of the latter. This nerve was easily avoided. A blunt iron probe then served to convey a double ligature under the artery, and the lower ligature was immediately tied. Mr. A. Cooper then detached the artery from the surrounding parts to the extent of an inch above the lower ligature, and then tightened the upper one. A needle and thread was then passed through the artery above the lower ligature, and below the upper one. The intervening part of the vessel was then divided. Lastly, the wound was closed with adhesive plaster. Suffice it to state in this work, that the patient instantly felt the violent pain in his head removed, and such complaint never returned; that the tumor immediately lost its strong pulsation, but yet had an obscure throbbing; that the swelling gradually subsided; and that the patient at length got quite well, and returned to his occupation as a porter.*

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* See his trans. of B. Bell's Surgery, vol. 5.

† See Medico-Chirurg. Trans. vol. 2, p. 1.

In the work referred to below, Mr. A. Cooper has recorded another case, where he tied the carotid artery; but, the aneurism being too far advanced, and an abscess arising, the patient died from the pressure produced on the throat. M. Burckhardt, of Stockholm, is also stated to have operated for a carotid aneurism; but the result was not known.† Mr. Cline has likewise taken up the carotid artery for an aneurism, which seems to have been attended with unpromising circumstances: the patient died in about three days after the operation.‡

In order to get at the carotid artery, Mr. Abernethy has recommended making an incision on that side of it next the trachea, where no important parts can be injured, and then to pass a finger under the vessel. The par vagum must be carefully excluded from the ligature; for, tying it would be a fatal blunder.

CHAP. XXX.

VARICOSE VEINS.

THE veins, however it may be with the arteries, are certainly subject to a preternatural dilation, technically termed a *varix*.

Any cause, producing a long-continued turgescence of particular veins, may, in the end, render them varicose. Thus, the gravid uterus, by pressing on the iliac vessels, frequently gives rise to varicose veins in the lower extremity, and rectum, in which latter situation they are named piles. In the same way, the depending position of a limb, long continued, may cause the disorder.

The superficial veins are most subject to become varicose, and the varix generally first occurs in the situation of a valve. In ordinary cases, the tumor is at first circumscribed below, in which direction the disease seems to be bounded by the valve; but, as the disease advances, the distention of the vein extends higher, and the varix loses its determinate figure, particularly at its upper part, and becomes more oblong. The fact is, the valves of a vein, that has been for some time varicose, no longer fill the area of the vessel, and, therefore, become incapable of supporting the column of blood. Hence, the affection may also extend in a direction from the heart, as well as towards it. The contained blood is at first fluid, and the tumor is so soft as to yield readily to the touch; but, sometimes in a more advanced stage, the blood coagulates, and the varix is then hard, and no longer recedes on pressure. Sometimes, a tolerably long portion of the vein is filled with coagulated blood, which, when drawn out of the vessel, appears like a worm.

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* See Medico-Chirurgical Trans. vol. 1, p. 222—233.

† London Med. Review, vol. 1, p. 319.

‡ Same work, vol. 2, p. 96.

When the distended vein is filled up with coagulum, the circulation of blood cannot go on through it, or, at least, but very imperfectly, and this fluid then accumulates below the varix, and dilates the contiguous branches. Thus the disease is increased, and the veins are frequently rendered varicose over the greatest part of the leg.

When the distention is trivial, it occasions little inconvenience; but, as it increases, it is attended with a troublesome and almost insupportable itching, and sometimes with very violent pain and inflammation. In the latter case, suppuration may be the consequence. The matter is always at first contained in the cellular substance surrounding the varix, and is often the forerunner of very obstinate ulcerations.

Varicose veins frequently burst, when accidentally and suddenly distended, or when pressed, or scratched, which proves, that their coats are relaxed and weakened, besides being dilated. In this circumstance, if proper care is not taken to stop the hemorrhage, a great deal of blood may be lost. After bleeding in this manner, the varix seems to undergo a diminution; but, this is only temporary.

There are two indications in the cure of varices, viz. to remove every impediment to the free return of the blood, and to restore the distended vessel to its former dimensions. Any tumor, pressing upon the trunk of the varicose veins, should, if possible, be removed, and, when practicable, the limb kept in an horizontal posture. When the cause of the impediment to the return of the blood cannot be removed, the cure is difficult to accomplish. Pregnant women cannot be cured of the complaint, till after delivery.

Astringent cold applications and the pressure of a bandage, are the most efficacious, for diminishing the diameter of the dilated veins. Cold water, ice, snow, brandy, or a solution of alum in vinegar, and various other lotions have been used, a bandage being also applied to the limb, with proper tightness.

This last means, however, is the most important, and it probably operates beneficially, in cases of varix, by obliging the blood to return through the deep-seated veins; so that the superficial ones, not being distended, become diminished in diameter. The pressure on the thickened vessels may also tend to lessen them.

In unusually obstinate cases, particularly, when profuse hemorrhages frequently take place from a varix, relief must be attempted by an operation; which consists in dividing the skin over the superficial trunk of the diseased vein, just below the varix, and passing a ligature underneath the vessel, so as to be able to tie it firmly, in the same manner as the arteries are tied. In truth, a varix is very analogous to an aneurism, or dilatation of an artery, and the circumstance seems to dictate an analogy of treatment. Instead, therefore, of tying a vein, between a varix and the heart, as proposed by Mr. Home, I am convinced, it would be more rational, in obstinate cases, to tie the vessel just below the varicose part.

The operation of tying the vena saphena, in cases of varicose ulcers, is described and considered in the chapter on ulcers.

HEMORRHOIDS.

As I am on the subject of varicose veins, I think it most convenient to notice here the complaint termed *hemorrhoids*, or *piles*, by which is generally implied any considerable distention of the veins near the termination of the rectum. When the dilated veins do not bleed, the swellings are called *blind piles*; but, when they do, they are denominated *open piles*. In some instances, they are external; in others, internal. In general, the inconvenience, which they produce, is very supportable; but, when they bleed profusely, or are inflamed, or strangulated by the sphincter ani, they give rise, in the first circumstance, to weakness from loss of blood, and, in the two latter, to very severe pain. When piles are large and numerous, they obstruct the passage of the feces, and the straining often brings on a prolapsus ani.

Although it is the common opinion, that piles are only varices of the hemorrhoidal veins, some well-informed surgeons seem to think, with much reason, that, in many instances, the disease is of a different nature. Richter defines hemorrhoids to be preternatural tumors of various sizes, from that of a pea to that of an apple, situated at the lower part of the rectum, and becoming sometimes distended with blood, and sometimes quite empty and collapsed. After a time, however, when they have been long and repeatedly in a turgid state, they never subside again, whether they are full and distended, or not so. Richter does not deny, that they may occasionally be dilatations of the hemorrhoidal veins, as is commonly supposed; but, he contends, that, in the majority of instances, they are formed by an effusion of blood under the lining of the rectum, and that this membrane alone, and not the coats of the veins, composes the containing sac.* Mr. Abernethy examined the structure of piles, and found them to be merely fleshy substances, possessing no vessels of considerable size. This gentleman at the same time admits, that dilatations of the hemorrhoidal veins do occasionally take place, as is evident from anatomical examination, and from certain cases seen in practice. In a recent attack of an hemorrhoidal affection, he says, that the tumor, on being punctured, sometimes bleeds like a vein. However, on the whole, Mr. Abernethy seems to think, with Richter, that piles are generally formed by effused blood, which, if not absorbed, becomes organized, and produces a permanent pile.†

Any thing, capable of retarding the return of blood through the hemorrhoidal veins, may cause the disease. The pressure of the gravid uterus, of the water in ascites, or of an enlarged liver, the frequent retention of hardened feces in the rectum, and a sedentary life, are enumerated among the causes of piles; and hence, women are more subject to the complaint, than men, though it is also very common in the latter subjects. It is clear, that, whether piles are mere varices, or cysts filled with blood, poured into them from the veins, the foregoing causes may give rise to the complaint.

TREATMENT.

When piles are constricted by the sphincter ani, and pain and inflammation are the consequences, the tumors ought to be returned into the rectum, unless it is judged more advisable to remove them. When they are inflamed, leeches and the cold saturnine lotion may be advantageously applied, and the tumors themselves should be smeared with the unguentum sambuci, with which is to be mixed a large proportion of the pulv. gallarum. The balsam copaib. should be taken, in the dose of fifty, or eighty drops in the morning, both in order to keep the bowels open, and to relieve by a peculiar virtue, which this medicine possesses, the local uneasiness attendant on the complaint. The rectum should also be kept empty, by the judicious employment of laxative clysters.

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* See Richter's Anfangsgrunde der Wundarzneykunst, band 6, p. 395, edit. 2, 1802.

† Surgical Works, vol. 2, p. 233—235.

Sometimes, when piles are constricted by the sphincter ani, they undergo a kind of spontaneous cure, by inflaming and mortifying. But, this is not usually the case; as, either the surgeon, or the patient himself, prevents such a painful curative process, by pushing the swellings up into the rectum again.

The means, which I have above specified, only serve to bring the complaint into a quiet state; they are not calculated to free the patient from the disease.

In all cases, where piles bleed profusely so as to weaken the patient; where, by their number, or magnitude, they obstruct the passage of the feces, and compel the patient to strain in such a manner, as to induce a frequent prolapsus ani; where they are often painful and inflamed; or where they interrupt the patient in his ordinary pursuits and exercises; the surgeon should recommend the extirpation of the tumors. The ancients were, indeed, afraid of removing bleeding piles, lest the stoppage of the discharge from them should excite dangerous consequences. On the continent, the same kind of timidity is not entirely removed;* but, in this country, practitioners have long ascertained, that piles may be as safely extirpated as most other ordinary tumors.

The extirpation of piles is performed either by tying them with a ligature, or by cutting them away.

In my opinion, the first of these methods should be preferred, when the tumors are situated rather high up the rectum; for, here the hemorrhoidal veins are so large, that the bleeding might prove troublesome and even dangerous. M. Petit, it is well known, met with an instance, where the patient bled to death from the excision of an internal pile,† and, therefore, we must not entirely disregard the idea of hemorrhage; though certainly in common cases, the danger is not great. I believe, that, frequently the tumors are not hollow, and that, when they are so, their cavity is not that of the vein itself. However, bleeding may still follow excision, if there is a free communication between the blood-vessel and the inside of the hemorrhoid; and the neighbouring vein may itself be cut in removing the swelling. Besides, it would be very difficult to cut away such piles as are situated far within the rectum, and are never protruded; though they may almost always be tied with the aid of a double cannula, like that described in the chapter on polypi. For these reasons, I think, that the ligature ought to be chosen, when hemorrhoids are situated high up the rectum.

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* See Nosographie Chirurgicale, par A. Richerand, tom. 3, p. 420, 421, edit. 2.

† See Sabatier's Médécine Operatoire, tom. 2, p. 206.

In all other instances, excision should be preferred, as the readiest, least painful, and safest method of cure. Petit relates instances, where colic affections,* and symptoms resembling those of strangulated hernia, followed the application of ligatures to piles; and the apprehension of hemorrhage, the principal objection to excision, is now known to be generally unfounded. Mr. Abernethy informs us, that it is now twenty years, since he began to remove hemorrhoids with the knife, or scissars, and that he never met with any circumstance to deter him from the practice. If the hemorrhoids to be removed are not already protruded, the patient must sit over a bidet, or close-stool, containing warm water, and urge the swellings out by straining. The surgeon may then cut them away, either with a knife, or a pair of scissars. Mr. Abernethy recommends the incision to be made in the longitudinal direction of the rectum. Until all chance of bleeding and inflammation is over, linen, wet with the saturnine lotion, is to be kept applied to the anus after the operation.

CHAP. XXXI.

WARTS AND CORNS.

WARTS are small cutaneous excrescences, which occur on all parts of the body, but chiefly on the face, and hands. They are generally hard, and free from pain, and are either connected with the skin by a slender pedicle, or by a broad base. The skin, beneath the wart, is in general moveable, and may be easily elevated; but, sometimes, it is attached to the parts below. Young people are more subject to these excrescences, than persons of advanced age. Warts seldom attain any very considerable size; the largest seldom exceed the size of a pea, nor are they often troublesome; though, sometimes, they become painful, and produce, especially when rubbed, or scratched, very unpleasant ulcerations. Such irritable warts are commonly from the first of a red, or livid colour, and are usually situated on the face.

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* See Sabatier's Médécine Operatoire, tom. 2, p. 209.

Verrucæ frequently occur on the penis, labia pudendi, and about the anus, and, in such situations, are frequently suspected to arise from a syphilitic cause. They may certainly be sometimes removed by tedious salivations; but, as they yield to the same remedies as cure common warts, and are then followed by no other venereal symptoms, we have no reason to believe, that they have a syphilitic origin. These kinds of warts are the largest which we see in practice.

Numerous local remedies, of a stimulating quality, will cure warts. Only a few can here be noticed. Aqua ammoniæ and tinct. canthar. are good applications; the warts should be frequently moistened with one of them every day.

A powder, composed of savin and ærugo æris, in equal proportions, is a common and very efficacious remedy; it is particularly useful in destroying warts growing around the corona glandis.

Lunar caustic is another application, which may be employed.

When the excrescences are very large, they may always be extirpated with a knife, and with more safety, than by the use stimulants; for large irritable warts, when stimulated, sometimes form very unpleasant sores, which throw out fungous granulations.

CORNS.

A corn is a hardness of the skin, has the appearance of brawn, and sometimes extends into the subjacent cellular substance. When the root of the corn does not reach more deeply than the skin, the indurated part is moveable; but, when it has a kind of appendage shooting deeply into the subjacent parts, the hardened swelling is fixed. Frequently, it elevates itself above the skin, and is not unlike a flat wart. It is as hard, dry, and insensible, as the thickened cuticle on the hands of labourers.

Corns on the feet are usually owing to wearing tight shoes, and, consequently, women and genteel persons are more frequently afflicted, than the lower classes. With regard to females, high-heeled shoes render them more liable to the complaint, by causing the whole weight of the body to fall principally on the toes, which thereby become wedged in the extremity of the shoe.

Sometimes corns do not occasion the least inconvenience; but, in other instances, they excite such violent pain as almost deprives the patient of the use of his feet, or, at least, renders walking and standing extremely incommodious. Doubtless, the pain proceeds from an inflammatory state of the parts in the circumference of the corn, which state is excited, and kept up, by the pressure of the induration. Corns are generally more painful in warm, than in cold weather.

There are two objects in the treatment; either to procure temporary relief, or to accomplish a permanent cure.

When the pain is severe, the patient usually finds relief on sitting down, pulling off his tight shoes, placing his feet in a horizontal posture, and becoming cool. But, the pain is thus not prevented from returning, when he again puts on his tight shoes and walks about. The pain may be got rid of for a somewhat longer period by cutting off the prominent portion of the corn, as far as it can be done, without exciting pain and bleeding, and by bathing the feet, a few times, in warm water.

In order to cure corns radically, the afflicted person must wear wide shoes, made of soft leather, and, for a time, must stand, and walk, as little as possible.

However, when a person cannot avoid walking, he may adopt a contrivance for keeping pressure from operating on the corn. Eight, or twelve pieces of linen, smeared with an emollient ointment, and having an aperture cut in the middle, exactly adapted to the size of the corn, are to be laid over each other, and so applied, that the corn is to lie in the opening, in such a manner, that it cannot be touched by the shoe, or stocking. When the plaster has been applied some weeks, the corn commonly disappears, without any other means. Should the corn be in the sole of the foot, it is only necessary to put in the shoe a felt sole, in which there is a hole corresponding to the situation, size, and shape, of the induration.

A corn may also be infallibly and permanently cured by the following method, especially, when the felt sole with a hole in it, and the plaster, are also employed. The corn is to be rubbed twice a day with any emollient ointment, and, in the interim, is to be covered with a softening plaster. Every morning and evening, the foot is to be put for half an hour in warm water, and, whilst there, the corn is to be well rubbed with soap. Afterwards, all the soft, white, pulpy outside of the corn is to scraped off, taking care not to give the least pain. The same treatment is to be continued, without interruption, until the corn is totally extirpated, which generally happens in eight, or twelve days.

There are numerous emollient plasters in repute for the cure of corns. One composition, said to be infallible, consists of two ounces of gum ammoniacum, the same quantity of yellow wax, and six drams of verdigrease. In a fortnight, if the corn yet remain, another plaster is to be applied.

CHAP. XXXII.

FUNGUS HÆMATODES, OR SPONGOID INFLAMMATION.

WE are indebted to Mr. Burns,* of Glasgow, for the first distinct account of this most formidable disease, and the subsequent and additional particulars of the subject, published by Hey, Freer, Wardrop, and others, render the history of the distemper tolerably complete. It commences with a small colourless tumor, which is soft, when not covered by an aponeurosis, but firm when situated beneath such a part.

When the disease occupies merely the adipose, or cellular membrane, upon the surface of the muscles, the tumor is not usually painful in its beginning; nor, does it impede the motion of the muscles, on which it is seated. But, when deeply seated in the limbs, it causes pain and weakness of the part affected. Also, when it occurs in the mamma, its growth is attended with considerable pain.†

For a considerable time, the tumor is smooth and even, but afterwards projects irregularly at one or more points, and here the skin becomes thinner, and of a lived red colour. The swelling has a considerable degree of elasticity, yielding to pressure, and rising up again immediately this is taken off.

The sensation of a fluctuation often seems to be so manifest, that the mistaken surgeon plunges a lancet into the tumor, with the intention of discharging the fluid supposed to be present. An error of this kind is generally a serious one, as a painful bleeding fungus, which rapidly acquires a very large size, shoots out of the opening, and by the irritation and loss of blood which it occasions, soon destroys the patient. But in the natural course of the disease, openings are at length formed in the projecting parts of the swelling, and a thin bloody matter is discharged. Almost immediately after the formation of these apertures, a small fungus protrudes, and this rapidly increases both in breadth and height, and frequently bleeds profusely. The discharge is thin and exceedingly fetid. The integuments round the ulceration are red and tender. The neighbouring glands swell, and assume the spongy morbid structure of the original tumor. If the patient still survives, similar tumors frequently make their appearance in other situations, and hectical symptoms, and repeated hemorrhages, put a period to life.

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* Dissertations on Inflammation, vol. 2.

† Hey's Pract. Obs. in Surgery, p. 290, 291, edit. 2.

On examining the affected parts after death, or amputation, the tumor itself is found to consist of a soft substance, somewhat like the brain; membranous partitions intersect it, and there are cells, or abscesses, in various places. The tumor frequently dives between the muscles down to the bones, and is not invariably contained in an entire cyst. The adjoining muscles are of a pale colour, and lose their fibrous appearance, becoming more like liver than muscles. The bones near the tumor are always carious. The disease sometimes appears to be brought on by external violence; but, frequently, the cause is quite unknown.

Fungus hæmatodes has now been observed in numerous situations, and organs, viz. the eye-ball, the superior and inferior extremities, the testicle, liver, spleen, kidney, lungs, uterus, ovarium, mamma, thyroid gland, neck, and fauces.

There is no remedy, with which we are acquainted, that seems to have the least power in checking this dire disease; all escharotics, even undiluted oil of vitriol, are incapable of destroying the fungous growths as fast as they are regenerated. Nothing seems to offer a prospect of preserving life, except the early and total removal of the disease with a knife. This, of course, is not always practicable, on account of the situation of the tumor. When it can be done, no part of the surface, surrounding the tumor, should be left, as the disease would certainly recur.

Here, however, it is incumbent on me to state the melancholy truth, that, excepting an instance or two where the eyeball appears to have been removed with the promise of lasting success,* every attempt to extirpate the disease by simply cutting away the morbid part has failed, the fungus re-appearing with increased malignity. The only cures, with which I am acquainted, are a few, which were accomplished by amputation of the limb, and are related by Mr. Hey. But, as the observations of the same gentleman prove, even amputation does not always have the desired effect; for, if the distemper has extended itself in the slightest degree to any part of the stump, a relapse appears to be certain.

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* See Hey's Practical Observations, p. 290, edit. 2; and Wardrop on Fungus Hæmatodes, p. 81.

It is much against the general success of all attempts to extirpate fungus hæmatodes, that the distemper is frequently not confined to one part, or organ. Thus, when the disease has appeared on the lower extremity, tumors of the same nature have been observed, after death, situated in the lymphatic glands, along the course of the iliac vessels and abdominal aorta; and when the eye-ball has been the seat of the disease, various little spots, or tumors, resembling in structure the medullary, or cream-like consistence of fungus hæmatodes in general, have been observed between the cranium and dura mater, and between the tunica arachnoides and pia mater.

Mr. Wardrop* seems to consider the medullary sarcoma, described by Mr. Abernethy, as fungus hæmatodes, an opinion, however, which the latter gentleman informs me he does not adopt. The chief differences, that I can discern, are, that, in the medullary sarcoma, after the parts have sloughed out, the place heals, until another similar swelling bursts the skin; but, in fungus hæmatodes, the fungus always grows larger and larger, without being materially retarded by sloughing, and no healing process ever occurs.

Although fungus hæmatodes has generally been confounded with cancer, it is undoubtedly a widely different disorder. Instead of being hard and unyielding, like a scirrhous tumor, it is generally soft and elastic. Instead of being intersected by ligamentous fibres, or bands, as the structure of a scirrhus is, fungus hæmotodes consists of a soft pulpy matter, which mixes readily with water, and is hardened by acids, or by being boiled in water. When the skin, or external covering of fungus hæmatodes gives way, instead of the morbid growth being destroyed by ulceration, as in cancer, a quick growing fungus arises from it, and the tumor seems to increase with even greater rapidity. This fungus, instead of having a firm texture, like that, which sometimes arises from a cancerous ulcer, is a dark red, or purple mass, of an irregular shape, and of a soft texture, is easily torn, and bleeds profusely when slightly injured. A primary cancer seems to be confined to few organs and few textures, and while, in some of these, fungus hæmatodes in its primary state has not been seen, it has been detected in other parts, where no true scirrhous structure has ever been met with, as, for instance, the liver, spleen, kidney, and lungs. While cancer also is rather a disease of advanced life; most patients attacked by fungus hæmatodes are young.*

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* Observations on Fungus Hæmatodes, p. 3.

Fungus hæmatodes of the eye will be described in the second part of this volume.

The particular swelling of the upper part of the calf of the leg, a case represented by Mr. Pott, in his remarks on amputation, as requiring this operation, is, no doubt, an instance of fungus hæmatodes.

CHAP. XXXIII.

SCROFULA.

PERHAPS this is a subject which requires more elucidation, than any other with which medical practitioners have so much to do. Though we daily see myriads of persons afflicted with various forms of scrofulous disease, we know little more, than its symptoms, and remain almost in utter ignorance, in regard to its causes and cure.

The fungus hæmatodes, cancer, and lues venerea, are certainly dreadful afflictions; but, perhaps, they are preferable to scrofula; for, we can sometimes totally extirpate the two former maladies by an operation, and we possess a specific for the venereal disease, while no operation can eradicate scrofula from the system, and though a few medicines seem to palliate, not one is efficacious enough to put a certain stop to strumous disorders.

Scrofula is more terrible by being an hereditary disease. Many eminent writers have considered the application of the term, *hereditary*, to scrofula, and, indeed, to diseases in general, exceedingly wrong, because the affections in question do not regularly descend from parents to children, and sometimes attack persons, none of whose relations are known to have had such diseases. No one, I presume, will venture to deny the tenor of the latter remarks. However, it is equally indisputable, that the children of scrofulous parents are much more likely to be affected with scrofula, than the offspring of persons, who never have had any symptoms of this disease. I have known so many instances of this fact, in the small circle of my own experience, that I do not entertain the least doubt on the subject. It is true, that the children of scrofulous parents may remain, for life, perfectly exempt from every mark of the disease. This, however, is not a point, which such writers, as employ the term *hereditary*, have the least inclination to dispute; for, their sole meaning is, that scrofulous parents more frequently have scrofulous children, than perfectly healthy people have. The offspring of the former, however, are not certain of being diseased in this manner; nor are the children of the latter sure of not being so.

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* See Wardrop on Fungus Hæmatodes, chap. 12.

Scrofula is certainly not a contagious disease, nor can it be communicated by contact, or even inoculation. Kortum tried to transfer scrofula from one person to another by inoculation; but, although he was at great pains to insert the matter completely, and although he repeated the experiment frequently, yet all his attempts failed of success, as no disease was communicated to the person inoculated, nor even any very evident irritation excited at the place where the matter was inserted.*

It is a contested point among writers, whether the operation of occasional causes alone can produce scrofula, without there being a predisposition to it. Of the proximate cause, I can only profess my total ignorance, and my disbelief in all the doctrines, which I have ever read, concerning it.

With regard to the occasional causes, climate is certainly a very powerful one. Mr. Russell† remarks, that the extremes of heat and cold are equally free from scrofula. It prevails most in climates, where the atmosphere is perpetually loaded with cold vapours; where the seasons are variable; and no weather settled. From latitude 45° or 50°, to latitude 60°, is the principal climate of scrofula. The climate of Scotland, which is within this range, is remarkable for the frequent occurrence of scrofulous complaints. Cold air, which is at the same time damp, is considered as that which is most conducive to the disease. It is now well known, that, when there is a predisposition to scrofula, even a temporary exposure to wet and damp, is often an exciting cause of an immediate attack. Wiseman relates a striking instance of a person who, in consequence of merely sleeping one night in a damp cellar, was attacked with strumous swellings, which occasioned his death, in less than a year.

Among the occasional causes of scrofula, we have also to mention many things, which have a tendency to weaken the system, such as bad air, a scanty allowance of unwholesome indigestible food, to which may be added uncleanliness, indolence, want of proper exercise, confinement in cold damp situations, and a deficiency of clothing.

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* De Vitio Scrofuloso, p. 218.

† Treatise on Scrofula, 1808.

External violence is also a very frequent exciting cause of scrofulous diseases, in persons disposed to them.

The peculiar constitution, in which the strumous tendency dwells, is very often denoted by particular appearances. A fine skin, light hair, a delicate complexion, light blue eyes, a tumid unhealthy countenance, and a swelling of the upper lip, are so frequently observable in scrofulous subjects, that such marks are deemed emblems of this peculiarity of constitution.

The local mischief, produced by scrofula, seems to invade the lymphatic glands and the joints more frequently, than any other parts.

Scrofulous inflammation is attended with a soft swelling of the affected part, which is very frequently a lymphatic gland. The covering of the gland becomes slightly thickened, and its substance doughy. The swelling increases, and the doughy feel changes by degrees into that of elasticity or fluctuation, and a circumscribed, hardened margin can be felt round the base of the tumor. The skin is slightly red. If, at this time, a puncture be made, little or no matter is evacuated, the lips of the wound inflame and open, displaying a sloughy looking substance within, and, betwixt this and the skin, a probe can often be introduced for some way all round.

When the disease is farther advanced, the tumor is soft, flaccid, and fluctuating; the skin becomes of a light purple colour, and small veins may be seen ramifying on its surface. The skin at length becomes thinner, and more dark-coloured at a particular part, then bursts and discharges a thin fluid, blended with a curdy matter. The redness of the skin continues, but the aperture enlarges, in proportion as the tumor subsides, and thus a scrofulous ulcer is the result.

The margins of this ulcer are smooth, obtuse, and overlap the sore; they are of a purple colour, and rather hard and tumid. The surface of the ulcer is of a light red colour; the granulations are flabby and indistinct. The discharge is thin, and contains flakes of coagulated matter. The pain is inconsiderable.

Such is the excellent and accurate description of scrofulous inflammation, suppuration, and ulceration, as afforded us by Mr. Burns. The limits of this work will not permit us to trace every form, which a scrofulous ulcer assumes.

If a diseased bone is situated under a sore of this kind, there is generally a sinus leading down to the carious part.

Scrofulous sores and abscesses frequently heal in one place, and then occur in another; and they are generally worse in summer, than in winter.

The white swelling of the joints will form the subject of an ensuing chapter, and the bronchocele and lumbar abscesses, which are often regarded as strumous disorders, will be noticed in the second part of the work.

GENERAL REMARKS ON THE TREATMENT OF SCROFULA.

It is almost needless to state, that all those circumstances, which have been pointed out, as occasional causes, must be avoided.

There is no medicine, which, internally administered, has the power of completely correcting the peculiarity of constitution, implied by the term scrofulous habit. But, there are many medicines, which seem to improve this state of the system, and to promote the spontaneous amendment, which strumous affections frequently undergo. Scrofulous subjects are generally possessed of constitutions, in which the natural actions do not proceed with vigour, and, perhaps, it is on this account, that every thing tonic is more or less useful in cases of strumous disease.

Bark, sea-air and sea-bathing, are among those means, from which patients afflicted with scrofula derive most relief. However, there are some few scrofulous subjects, who are so plethoric, and have, what are termed, such gross habits, that bleeding and evacuations will be proper.

On the other hand, there are some strumous patients, both children and adults, who feel no glow after cold bathing, but shiver, and feel low, and depressed, for a considerable time, after coming out of the water. The warm bath for these subjects should be recommended, instead of the cold one, at least, for a certain time. Mr. Russell, indeed, gives a general preference to warm bathing in all strumous cases.

The muriated barytes has been recommended by Dr. Crawford; but, repeated trials have not greatly increased the repute, which this medicine suddenly obtained.

Mr. Burns gives the following formula:

℞ Terra ponder. salit. chryst. gr. x.
Aq. font.
Aq. cassiæ utriusque uncias iij.
Syrupi Aurentii uncias ij.—To begin with a dose of ʒſs twice or three times a day.

Burnt sponge, and natron ptt.* taken internally, are extremely serviceable in diminishing the size of some scrofulous swellings.

Cicuta has been greatly recommended, and it ought to be noticed, that its efficacy is chiefly apparent, when given in cases, in which there are scrofulous sores of a more irritable nature, than common. Dr. Storck, of Vienna, first praised cicuta, as a remedy for scrofula; but, its virtues, in this way, have been greatly exaggerated.

Mercury, when exhibited só as to produce a salivation, is always hurtful; the only way in which it does good is as an alterative; and calomel, or the corrosive sublimate, is the most eligible preparation. The observations of Mr. White, are particularly in favour of the former of these two preparations. Mr. Russell speaks also, very highly of small doses of calomel, persevered in, every day, for a long while, in cases, in which the glands and soft parts are swelled.

Two or three drams of nitrous acid, taken daily, are said to have promoted the suppuration of scrofulous glands, and disposed ulcers to heal. If no good effects are produced in a fortnight, the medicine ought to be discontinued.

In malignant scrofulous ulcers, the hepatised ammonia, in the dose of eight or ten drops thrice a day, has proved beneficial by abating pain, and changing the bad aspect of the sores.

Vitriolic emetics, reaptedly exhibited, are said to be useful.

Mr. Russell appears to entertain a favourable opinion of the mineral waters of Moffat and Harrowgate, for scrofulous patients.

This gentleman seems to consider, that-bark is not indicated, in scrofulous cases, before the bowels have been well emptied. Nor does he think this medicine adapted to that state of scrofula, in which any tendency to fulness prevails, or when the glands are swelled and indurated. However, he approves of bark, when there exist symptoms of weakness, and he thinks its efficacy is most apparent, in cases, in which there are extensive ulcers, or large abscesses, which discharge a copious quantity of matter.

Mr. Russell has represented iron, as a generally better medicine, in scrofulous cases, than bark. The carbonate of iron, the muriatic solution, and chalybeate waters, are the best medicines of this kind. Doses of the diluted sulphuric acid, also, have a tonic effect, and are well spoken of by the above practitioner.

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* ℞ Natri ppt. ℥j.
Saponis ℈j. M. ſt. pil. xii.
Dosis quatuor ter quotid.

The muriate of lime has been praised for its efficacy in strumous diseases, when given in large doses. But, its virtue is much doubted by Professor Thomson, of Edinburgh, and, in many instances, he found it do harm.

With respect to the local treatment of scrofulous tumors and ulcers, little is to be said. Such glandular swellings might be safely extirpated with the knife, when they are favourably situated, and the wound would heal as well as could be wished. But, surgeons do not adopt this practice, perhaps, because patients experience no severe pain from an indolent sort of enlargement, which also in time, very often spontaneously gets well, and because the removal of a scrofulous gland can hardly be said to do much good to a patient, whose whole system is under the influence of strumous disorder.

Suppurated scrofulous glands ought never to be opened, unless the quantity of contained matter is copious, which is very seldom the case. Sometimes such swellings spontaneously diminish without ulceration; but, when a puncture is made, this chance is destroyed, as the wound changes into an unhealthy sore.

CHAP. XXXIV.

OF SYPHILIS, OR, THE VENEREAL DISEASE.

GENERAL OBSERVATIONS.

THE venereal disease is the consequence of a specific, morbid poison, which, being applied to the human body, produces effects, either on the part, to which it is immediately applied, or on various parts of the system, in consequence of absorption.

Though we are so well acquainted with the operation of the venereal poison in the human body, we remain in perfect ignorance, in respect to its general properties. Our want of information on this subject, however, is the less to be lamented; for, were we as well acquainted with the nature of the venereal virus, as we are with that of the acids and alkalies; were it in our power, in consequence of this knowledge, to introduce such remedies into the system, as would completely neutralize the syphilitic poison out of the body; still our projects would fail, since the Hunterian doctrines maintain, that the mere contact of the virus is sufficient for the future production of the malady; that the poison, when once introduced into circulation, produces a disposition to the disease in such parts as are susceptible of being affected; that, after the disposition is formed, the disorder must follow, even though every atom of the poison be expelled from the system; and, that the number of parts affected, depends on circumstances, which we cannot explain.

How long the venereal disease has existed in the world is quite unknown. Several writers have endeavoured to prove, that its antiquity on the old continent is very great; but, the opinion, commonly adopted, is that supported by the learned Astruc;* viz. that the disorder was first imported into Europe, from the West Indies, by the followers of Columbus, towards the close of the fifteenth century.

The partisans of this last sentiment, however, do not deny, that discharges from the genitals, sores on these parts, and various eruptive complaints, have affected the human race, from time immemorial, as a variety of passages in ancient authors fully prove; but, then, facts of this kind will never justify the conclusion, that syphilis is as ancient as the time of Moses, or the days of the Greeks and Romans. If these last had been acquainted with lues venerea, their licentious poets, especially Horace, Juvenal, Perseus, and Ovid, would not have been silent on a subject, so perpetually occurring in the satirical writings of Pope and Swift.

I shall now endeavour to lay down the leading and most interesting general opinions, concerning the nature of the disease at present engaging our notice; and, it appears to me, that the most advantageous way of doing this, will be to review the fundamental doctrines of the late Mr. Hunter. A few things, however, must first be premised, for the instruction of the student.

The effects, produced on the part, to which the venereal poison is directly applied, are called *primary symptoms*; while those, happening in consequence of the virus having been absorbed into the circulation, are termed *secondary*.

When the primary symptom is a sore, it is denominated a *chancre*; and, when the absorbed matter, in its course towards the circulation, makes the absorbent vessels or glands inflame and suppurate, the latter complaint is named a venereal *bubo*, which likewise generally ranks as a primary venereal symptom, because it is caused by the virus; while this is only on its way into the circulation, and is not in reality an effect of the poison being actually blended with the blood.

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* De Morbis Venereis.

According to several authors, and amongst them is Mr. Hunter, the primary symptom may be a discharge of venereal matter from the urethra, or from the surface of the nymphæ clitoris, meatus urinarius, &c. in women, well known by the name of a *clap* or *gonorrhœa*.

The earliest or first order of *secondary symptoms* generally consist of ulcers in the throat or skin, or of spots on the surface of the body. The later order of secondary symptoms are, either swellings of the bones, periosteum, and tendons, called *nodes*, or else mere pains in these parts.

In the opinion of Mr. Hunter, gonorrhœa and chancre arise from the application of the same specific virus.

The difference of the effect is attempted to be explained by the application being made, in the first instance, to a secreting surface, and, in the second, to a non-secreting one.

On the other hand, the best practitioners of the present time disbelieve in the identity of the infection giving rise to these two very different cases; because gonorrhœa can be entirely cured without mercury; because gonorrhœas have prevailed from time immemorial, and, on that account, were never regarded by the first observers of syphilis, as being at all connected with the new distemper; because it is questionable, whether secondary symptoms ever actually proceeded from gonorrhœa; and, lastly, because B. Bell and others have not been able to cause either a chancre, or secondary symptoms, by inoculation with gonorrhœal matter, as Hunter is represented to have done; nor, gonorrhœa by the insertion of syphilitic matter within the urethra. As some reflections on this point are contained in the chapter on gonorrhœa, I shall merely add my own belief, in this place, that gonorrhœa and chancre do not depend upon the same virus.

Mr. Hunter believed, that the syphilitic poison arose in the human race, since it appears to be incapable of exerting its specific effects on any other animals. He also concluded, that, it must have been originally formed on the genitals, as, in all probability, had it been first lodged on any other part, its effects would have been confined to the individual first affected.

The disease cannot be imparted, through the medium of the atmosphere; but only by the poison being actually placed in contact with the human body.

We are quite ignorant what the venereal poison itself is in an unmixed form; and, perhaps, it never exists, except as blended with pus, or some other secretion, which is generally, though not always, the product of inflammation.

According to Mr. Hunter, the application of venereal matter commonly gives rise to inflammation, followed by a discharge from secreting surfaces, and by ulceration on other parts. It is acknowledged, however, that inflammation is not invariably produced by the application of the virus. The matter, formed and secreted by the chancre, gonorrhœa, and even by a bubo, is of the same specific quality, as the matter first applied, and contains the venereal poison, which is generated by the peculiar action of the affected vessels, which action is superadded to that occasioning ordinary suppuration.

Mr. Hunter thought, that the number and virulence of the symptoms were not at all influenced by the quantity of the poison absorbed, nor by its being more or less diluted.

Although the matter of *primary* venereal complaints, viz. chancre, bubo, and, according to Hunter, gonorrhœa, also, contains the venereal poison, and can communicate the disease to others, the matter of all *secondary* venereal complaints does not contain the specific virus, nor, of course, possess the property of being able to impart the distemper to others. Neither is the blood, nor any of the secretions, of a venereal patient, possessed of such quality.

After the venereal virus has been conveyed into the circulation by the absorbents, Mr. Hunter inferred, that it did not long continue there, but was soon ejected, together with some of the excretions. Previous to its expulsion, however, it contaminates certain parts of the body, and gives them a *disposition* to the disease. Mr. Hunter's chief reason for supposing, that the virus does not remain long in the circulation, is, that, when the parts, first affected by the secondary symptoms, have been cured, before the disease is eradicated from such parts, as are generally affected with secondary symptoms at a later period, the first parts, which have been cured, never again become diseased, *from the same stock of infection*, as, in all probability, they would do, if the virus continued mixed with the circulating fluids.

The reasons, why the virus, after being absorbed, is sometimes expelled again, without leaving, in any parts whatsoever, the disposition to the disease, or in other words, any contamination, are not very well solved by the Hunterian theories. Neither do they explain to us, why the number of parts, to which the disposition is communicated, by the absorption of the virus into the system, should vary so considerably, as we find happens in different examples. Mr. Hunter, indeed, assigns to mercury the power of *preventing* the formation of the disposition; but, then, he represents the presence of the virus in the constitution, as being so transient, and the disposition to the disease, as being produced so nearly about the same time in whatever parts are contaminated, that, in a multitude of cases, the supposition, that mercury has been given in time enough to *prevent* the disposition in all or some parts, is altogether inconsistent with the foregoing principles.

But, though Mr. Hunter believed, that the *disposition* was formed nearly about the same time in such parts as happen to be contaminated; yet, his doctrines teach us they fall into a state of palpable disease, or (to use his own language) they afterwards take on the diseased *action* at different periods, some shewing much sooner, than others, the local effects of the disease. This remarkable circumstance in the history of syphilis Mr. Hunter endeavours to account for, partly by the different susceptibility of action in different organs, and partly by the effect of external circumstances having no relation to the poison or the constitution.

Of these external circumstances, one of the principal is cold, which accelerates the local effects caused by the passage of the virus through the system. The change from *disposition* to *action* appears also to be hastened by proximity to the surface of the body, and by any great disturbance in the habit from scrofula, gout, rheumatism, and, more especially, fever.

It was likewise one of Mr. Hunter's tenets, that the change from disposition to action never happened while the constitution was under a mercurial irritation.

He inculcates, that, when the disposition has taken place, the action may be suspended by mercury; but the disposition will remain, and the action shew itself at some period after the mercurial irritation has ceased. But, although mercury cannot destroy a disposition already formed, it may hinder the disposition from being formed at all, or, in other words, prevent contamination. When the action has begun in an order of parts, it may be cured, and will not return in the part, or that order of parts, from the same stock of infection. But the diseased action may take place in another order of parts, if that other order has been contaminated; and, in this order, it must be treated as in the former. When the diseased action has taken place, and been cured in the part first affected, in the throat and fauces, the skin and the bones, or periosteum, the patient may be regarded as free from the disease, as far as our knowledge has hitherto traced it.

The usual time of the skin, or throat, taking on the diseased action, is, on a medium, six weeks after the mercurial irritation, that cured the first symptoms, has subsided; and in the bones, about twice that time; but these intervals between the primary and secondary symptoms, are subject to much variety.

Whatever doubtful appearances may arise in the skin, throat, or bones, during the mercurial irritation under which chancres or buboes are giving way, they are not venereal; and even if such secondary symptoms occur, after that mercurial irritation has ceased, but earlier than the usual periods above specified, they are not to be regarded as unequivocally syphilitic. If no secondary symptoms appear in three months after the mercurial irritation has ceased, and the constitution has not, in the mean time been occupied by any other disease, we have for the most part, no reason to apprehend any complaints in the skin or throat from that stock of infection.*

That there are some glaring inconsistences in Mr. Hunter's precepts, with regard to the venereal disease, I think no man of common sense or candour will deny. One of the most striking incongruities is Mr. Hunter's asserting, that mercury cannot cure the disposition, and yet, by way of security, prescribing mercury, in his practice, a certain time after all existing palpable symptoms have been cured.

The employment of this ambiguous term, *disposition*, and the theories connected with it, have in particular been the subjects of criticism. It has been contended, that we have no proof whatever of the existence of the state, which Mr. Hunter implies by disposition. If, observes an anonymous writer, after a certain course of mercury, and the consequent removal of a chancre, blotches should appear, then, says Mr. Hunter, a disposition had been formed, which no quantity of mercury could have destroyed; but may we not, with at least equal probability, say, that in such cases mercury had been insufficiently used? If, on the other hand, after such a course, no blotches should occur, the friends of the doctrine tell us, that the secondary order of parts had not been contaminated; but, in this case it may also be said, that the mercurial course had been judicious and efficient.†

Throughout Mr. Hunter's writings, we are taught to believe, that it is the invariable character of all really venereal complaints to become progressively worse, and never undergo any amendment, unless mercury, the specific remedy, is exhibited. Thus, chancres on the penis, and ulcers in the throat, are described as constantly growing worse, without the aid of mercury. For my own part, I think this doctrine by no means certain, or rather as deserving further investigation, since it is one of infinite importance in relation to practice. If a sore puts on a healing appearance without the aid of mercury, we are to infer that the complaint is not venereal. In many doubtful cases, we are advised to defer the employment of mercury, for the purpose of judging of the nature of the disease by the foregoing criterion. But, on the other hand, is it not a fact, that primary venereal symptoms will *sometimes* yield to several medicines besides mercury? The mass of evidence in favour of the nitrous and muriatic acids, the oxymuriate of potassa, &c., being in a certain degree anti-venereal, is weighty and respectable.* I do not wish to insinuate, that these remedies can be depended upon as much as mercury; but only that they possess considerable power over syphilis, and will sometimes make chancres, venereal ulcers in the throat, &c., give way. Mr. Pearson, as having held the situation of surgeon to the Lock Hospital a considerable time, is looked up to by many quite as an authority on the present subject. Does not this gentleman distinctly allow, that guaiacum and sarsaparilla are capable of alleviating symptoms derived from the venereal virus, though not of eradicating the disease?† Does he not state, that even bark sometimes will have a salutary effect on incipient buboes, ulcers of the tonsils, and gangrenous sores, from a venereal cause? Does he not mention the almost complete reduction of venereal buboes by this medicine?‡ Has he not found that the ammonia præparata will sometimes relieve pains of the limbs, and *remove a venereal eruption?*§ Does he not confess having given the muriate of barytes, with great advantage, when he could not determine positively whether the case was venereal or not?|| Does he not mention, that elixir of vitriol will sometimes stop the progress of venereal ulcers, and make venereal eruptions fade and almost disappear, though the benefit is not permanent? Have we not the evidence of Mr. Pearson, in confirmation that the nitric and vitriolic acids have removed both the primary and secondary symptoms of syphilis; and in some instances without the former having recurred, nor the latter appeared at the usual time, when the cure was imperfect? I am not to conceal, however, that Mr. Pearson and several of his friends affirm, that they have never seen a permanent cure accomplished by these acids, where secondary symptoms have been present. Nor is the efficacy of such remedies in curing primary symptoms, according to Mr. Pearson, sufficiently frequent to make them eligible medicines.*

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* See Hunter's Treatise on the Venereal Disease, and Adams on Morbid Poisons, edit. 2, p. 159, 160.

† See London Medical Review, vol. 3, p. 248, 249.

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* See the publications of Dr. Beddoes, Dr. Rollo, Mr. Cruickshank, Dr. Ferriar, Mr. Blair, &c.

† Observations on the effects of various articles in the Cure of Lues Venerea, edit. 2, p. 12—25.

‡ Lib. cit. p. 61. § p. 91. || p. 106.

If, then, so many remedies are alledged to possess a certain anti-venereal quality, we must at least receive with doubt, the doctrine, that all venereal affections constantly become progressively worse, and never undergo the least amendment, nor put on a healing appearance, without the aid of mercury. If an incipient venereal bubo may sometimes be reduced by bark, as Mr. Pearson affirms, or if guaiacum, sarsaparilla, mezereon, walnuts, and opium, have often removed some of the primary and secondary symptoms of lues venerea, as the same gentleman confesses, then I think we are almost justified in suspecting that it is by no means the invariable character of syphilitic complaints to proceed, in every instance, from bad to worse, even though no medicines at all may be exhibited. But, whether this suspicion be correct or not, the observations of the above gentleman prove, that venereal sores, &c., will often become better, and even heal, without mercury.

CHANCRES.

Chancres signify sores which result from the application of venereal matter to a part of the body; and consequently they are generally situated on the genitals. The syphilitic matter thus applied produces its specific inflammation and ulceration, attended with a secretion of pus, and the matter secreted partakes of the nature of the matter first applied.

A chancre has in general a thickened base; and, although the common inflammation sometimes spreads much further, the specific is confined to this spot. The preceding inflammation begins with an itching; and if the glans penis be the part affected, a small pimple, full of matter, forms, without much hardness or swelling. When the disease occurs on the prepuce, or frænum, the effects of the inflammation are more extensive and visible. The itching is gradually changed into pain; the surface of the prepuce is in some cases excoriated, and afterwards ulcerates; in others, a small pimple precedes the formation of the ulcer. Then a thickening of the part takes place;

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* Observations on the effects of various articles in the Cure of Lues Venerea, edit. 2, p. 236, 237.

and while this effect remains altogether specific, it is very circumscribed, and its edge terminates rather abruptly. The base of a chancre is hard, and its margin somewhat prominent. Sores of this description, situated on the glans, sometimes cause profuse bleeding.

In women, chancres are usually situated on the labia, or nymphæ; sometimes on the perineum; but very rarely in the vagina.

The matter of chancres contains the venereal virus, and of course is capable of imparting the disease.

TREATMENT OF CHANCRES.

Chancres admit of two modes of treatment; 1. That of destroying them with escharotics, or removing them with a knife; 2. That of overcoming the venereal irritation by means of the specific remedy for the effects of the poison.

By the first method the chancre is reduced to the state of a common sore, or wound, and heals up as such. This can only be done on the first appearance of the chancre, when the surrounding parts are not yet contaminated. If the sore is on the glans, touching it with the argentum nitratum is preferable to an incision, because the hemorrhage, in the latter way, would be troublesome.

But, as in most cases it is uncertain, whether absorption has taken place, this practice is not entitled to much confidence, even when the chancre has been destroyed on its first appearance; and it is generally right to give mercury internally. The best dressings for chancres are unguent. hydrarg. or a solution of cuprum, or zincum vitriolat.

The modes of giving mercury internally will be presently considered.

It is here necessary to state, that chancres are often influenced in their progress by constitutional causes. In irritable weak habits, even after the venereal quality of the sores is destroyed by mercury, the ulceration may continue to spread, or extensive sloughs may form. The foul appearance of the diseased surface leads the unwary practitioner to increase the exhibition of mercury; and thus the system becomes more and more disordered and debilitated, and the local mischief proceeds from bad to worse.

When chancres spread rapidly by a sloughing process, there is always strong reason to believe, that the circumstance is owing to an unfavourable state of the constitution, and irritability of the diseased part. In such cases, the omission of mercury internally should be tried; bark, fresh air, and food of a nourishing quality, should be given; and, of all local applications, not one is more serviceable, than a solution of opium, in the proportion of a dram and a half to a pint of water. Thus the state of the system will be amended; and, as this happens, those morbid appearances of the sore, which depended on general weakness and irritability, will disappear, and then, if necessary, mercury may be given again.

An indolent knob, or lump, is sometimes the forerunner, sometimes the consequence of a venereal sore on the penis, and it is very tedious in undergoing any change.

BUBOES.

While no venereal matter has been taken up from the surface of a chancre by the absorbent vessels, the disease is entirely a local one. The matter in being absorbed is very apt, in its passage through the inguinal glands, to occasion an inflammation and enlargement of them, followed by suppuration and ulceration. This secondary affection is named a venereal bubo. The syphilitic poison may lodge on the sound skin, and be absorbed without the occurrence of an ulcer, and a bubo may be the consequence. However, buboes are commonly preceded by a chancre; and they more frequently follow sores on the prepuce, than those on the glans.

The absorbent glands in the groin are subject to enlargements altogether unconnected with venereal causes, and the practitioner should discriminate syphilitic affections of this kind from other swellings in the groin arising from different causes. Mr. Hunter was of opinion, that commonly only one gland is affected at the same time, in consequence of the absorption of venereal matter, and, if this be the case, we have one criterion, by which we may know how to distinguish a venereal bubo from other swellings. Venereal matter also affects the glands nearest the seat of absorption, and never those, which are situated in the course of the iliac vessels, and higher up.

The bubo commonly begins with a sense of pain, and a small hard tumor soon becomes perceptible. This increases like every other inflammation, that has a tendency to suppurate, and, if not checked, advances to suppuration and ulceration, the progress of the matter to the skin being quick.

Some few venereal buboes are slow in their progress, and Mr. Hunter suspected, that, in these instances, the inflammatory process is retarded by mercury, or a scrofulous tendency.

The true venereal bubo is usually confined to one gland, and does not become diffused before suppuration has taken place. It is rapid in its progress from inflammation to suppuration, and ulceration. The quantity of matter that forms is copious, and the pain is very acute. The colour of the skin, affected with inflammation, is a florid red.

The nature of an enlarged inguinal gland is always attended with more uncertainty, when the swelling has originated without being preceded by an ulcer on the genitals.

Buboes which are not venereal are generally preceded, and attended with a slight fever, or, as Mr. Hunter says, the common symptoms of a cold, and the swellings are usually indolent and slow in their progress. When more quick than common, they become more diffused than venereal buboes, and affect more than one gland. In general they do not suppurate, but continue stationary; and, when they do suppurate, it is slowly, and often in more glands than one. The matter comes slowly to the skin, unattended with much pain, and the colour of the integuments is a dark purple.

If the swelling is only in one gland, is very slow in its progress, and gives but little or no pain, it is probably scrofulous.

The matter of a venereal bubo contains the virus, and is therefore capable of communicating the disease.

TREATMENT OF BUBOES.

In attempting to disperse venereal buboes, it is a great object to make as much mercury as possible pass through the swelling, by rubbing the unguent. hydrarg. on surfaces, from which the absorbents tend to the local disease. The same plan is equally commendable when a bubo is in a suppurated state; for, both in this and the preceding stage of a bubo, the medicine thus applied cannot pass into the common circulation without going through the diseased parts, and it must promote the cure in its passage through them, while at the same time, it prevents the matter, which has already passed, and still continues to pass, into the constitution, from acting there, so that the bubo is cured, and the constitution preserved.

The thigh, leg, or part of the abdomen on the same side as the bubo, are the proper places. Mercury, however, can only cure the specific quality of the inflammation. When the common inflammation rises very high, bleeding, purging, and fomentations may be useful auxiliary means. If the bubo is conjoined with erysipelatous inflammation, bark is indicated; if with scrofulous, hemlock may be administered, and poultices made with sea-water applied. Buboes ought seldom to be opened. When it is thought proper to open them, the skin should be allowed to become as thin as possible, as the abscess will heal better in consequence of this rule being observed. The mercurial frictions are to be continued in the way abovementioned; but it is not always right to persevere in the employment of mercury until a bubo is completely healed. If it is very slow in healing, the mercury may be discontinued after the constitution has been kept a reasonable time (perhaps five or six weeks) under the evident influence of this potent medicine. In other cases, in which the bubo has rapidly healed, mercury should be given for a fortnight or three weeks after the disease in the groin is quite well. It is impossible to lay down any unexceptionable rules in these cases.

Sometimes the sores produced by buboes assume an ill-conditioned appearance, even when they are losing, or are quite deprived of the venereal disposition. We are not always to set down the backwardness of a bubo to heal, as a mark of the presence of the original disease. The disorder, produced in the system by a course of mercury is frequently a cause, why syphilitic buboes are gradually converted into phagedenic ones, or such as will not cicatrize. In scrofulous constitutions, the irritation of venereal matter, in its passage through an absorbent gland frequently gives rise to a scrofulous enlargement of the groin, and this disease will not be made to heal by the influence of mercury; on the contrary, if the system should have already suffered much from a mercurial course, perseverance in this treatment will change the usual indolence of a scrofulous abscess and ulcer into a very foul, spreading, ill-conditioned, local disease.

In such cases, bark, sea-bathing, pure air, and the internal and external use of hemlock, are highly serviceable.

LUES VENEREA.

A chancre, or a bubo, may occur without the general system being at all contaminated; but when the virus has been conveyed into the circulation, certain parts, susceptible of the effects of the venereal poison, are in danger of being contaminated, or (to use Mr. Hunter's language) may have the disposition to the disease communicated to them, which diposition is incurable by mercury, and must sooner or later change into action, or a state of palpable disease.

The first order of parts becoming diseased, in consequence of this diffusion of the virus through the system, consists of the skin, tonsils, nose, throat, inside of the mouth, and sometimes the tongue.

The second order of parts, or those becoming affected in the latter stage of lues venerea, comprehends the periosteum, fasciæ, and bones.

VENEREAL ERUPTIONS.

At first, the skin is generally mottled with discolourations in every part of the body, no part being more susceptible than another. Many of these discolourations disappear,* while others continue, and increase with the disease.

In other instances there are distinct blotches, which are often not observed till the scurfs are forming. In some cases, the eruptions come out in the form of small distinct inflammations, containing matter, and resembling pimples; but not so pyramidical nor so red at the base.

Venereal blotches are often attended with a degree of transparency, particularly in warm weather. The degree of inflammation first attendant on the eruption soon goes off, and the cuticle peels off in the form of a scurf.

A copper-coloured, dry, inelastic, cuticle forms. This is thrown off, and a new scurf of the same kind is regenerated. These appearances spread to the breadth of a sixpence; but seldom more extensively, at least for a considerable time. Every succeeding scurf becomes thicker and thicker, till at last it becomes a common scab, and matter forms in the cutis beneath, so that, at last, the blotch becomes a true ulcer, which usually spreads, although in a slow manner.

VENEREAL SORE THROAT.

In the throat, tonsils, and inside of the mouth, lues venerea generally makes its appearance as an ulcer without much previous swelling. Common inflammation of the tonsils often suppurates in the centre, so as to form an abscess, which bursts by a small opening; but this complaint never looks like an ulcer, which begins on the surface, like the true venereal one. This kind of case is always attended with too much inflammation, pain, and swelling, to be venereal, and immediately the little abscess has burst, the swelling subsides; the complaint is also in general attended with febrile symptoms.

Another disease is an indolent enlargement of the tonsils, and it is peculiar to persons disposed to scrofula. There are portions of thick mucus, or perhaps coagulating lymph, on the surface of the tonsils, and these are frequently mistaken for sloughs or ulcers. When there is doubt, such matter may be taken away with a probe, so as to shew, that there is no cavity beneath.

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* Though such is the observation of Mr. Hunter, I know many eminent surgeons, who immediately pronounce an eruption not to be venereal, if any part of it dies away without the interference of mercury.

An ulcerous excoriation of the tonsils is another disease liable to be mistaken for a venereal ulcer of these parts. This sometimes becomes very broad and foul, having a regular margin; but never extending deeply into the substance of the parts, as the venereal ulcer does.

The true venereal ulcer is a fair loss of substance, part being, as it were, dug out of the body of the tonsil. It has a defined edge, and is commonly very foul, having thick white matter adhering to it, like a slough, which cannot be washed away.

When the tongue is affected, sometimes it becomes thickened and hardened. At other times, it ulcerates.

NODES.

The swellings of the periosteum, tendons, and bones, from a venereal cause, are so called. The progress of the disease in this form is extremely slow, and attended with little pain. In some cases, however, the pain is considerable, particularly in the night time. Nodes continue a long time before the matter forms, and then it is a very imperfect kind of suppuration which follows.

Sudden swellings of the periosteum, without nocturnal pains, are not venereal.

The bones, which are peculiarly liable to nodes, are such as are superficial; for instance, the front surface of the tibia, the bones of the cranium, the triangular part of the ulna below the olecranon, &c.

VENEREAL OPHTHALMY.

Mr. Hunter doubted the existence of this case; but the generality of modern practitioners admit it in the class of diseases. The conjunctiva is said to have occasionally spots on it, somewhat similar to those on the skin.*

VENEREAL ULCERS IN CONSEQUENCE OF LUES VENEREA.

It has been already stated that a venereal abscess, or ulcer, has the power of generating matter of a specific quality, and similar to that, which first caused the disease. This remark, however, only applies to a chancre and a bubo; for secondary venereal sores, or such as result from the general contamination of the system, do not secrete matter, capable of communicating the disease by inoculation or absorption.

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* The symptoms and treatment will be described in the chapter on ophthalmy.

TREATMENT OF LUES VENEREA.

Mercury is the great specific in the cure of all venereal complaints, and it may be conveyed into the system, either externally by the skin, or internally by the mouth. In particular constitutions, mercury employed in one way seems to have no effect on the constitution or disease, and then it must be tried in the other. In the same manner, when one preparation of the medicine proves ineffectual, another should be tried, as the change is frequently followed by more beneficial effects on the disease than many might suppose.

Sometimes the bowels can hardly bear mercury, and, in this circumstance, it is to be given in the mildest form possible, conjoined with other remedies for diminishing its bad effects on the viscera.

In general, the external employment of mercury is the most advantageous and convenient.

In giving mercury, the first attention should be to the quantity, and its visible effects at a given time; for when those effects have attained a certain pitch they are not to be increased, but only kept up, while the decline of the disease is watched; thus we judge of the invisible, or specific, effects of the medicine.

The visible effects of mercury are of two kinds; the one on the constitution, the other on parts capable of secretion. In the first, it appears to produce universal irritability, a quick pulse, &c. Salivation, or an extraordinary secretion of saliva, attended with soreness of the gums and mouth, forms the second description of effects. The latter affection is the criterion, by which practitioners generally calculate the influence, under which mercury has placed the constitution.

Mercury should always be introduced into the system gradually, beginning with small quantities, which may afterwards be increased. One scruple, or half a dram of mercurial ointment may be rubbed in at first every night. If the mouth in a moderate time is not affected, the quantity may be gradually increased to one, two, or three drams. If all the symptoms disappear, the frictions may be continued a fortnight afterwards by way of security.

When mercury is given internally, there are three preparations commonly preferred in venereal cases; the pil. hydrarg. which may be given in the dose of gr. x. every night, either with or without opium, as circumstances may indicate; the hydrarg. calcin. in the dose of gr. i. with or without opium; and lastly, a solution of the oxymuriate of mercury (sublimate). One fourth of a grain dissolved in brandy, or any aromatic water, is the usual dose.

With respect to the preparations of mercury, the most simple are not only best, in consequence of their acting with least violence on the system, but also because they prove more efficacious in the cure of the disease. Hence, frictions with the ointment, and the pil. hydrarg. are the most commendable.

It is incumbent on me to mention fumigation, another mode of introducing mercury into the constitution through the skin. It is one of the most ancient forms of administering mercury, and was much praised in France by M. Lalonette. Mr. Abernethy has more recently spoken of the advantages of this plan in one of his publications, and he recommends a powder for the purpose, made by agitating calomel in water, mixed with the volatile of alkali. The patient is to be placed in a machine, not unlike a sedan chair, but having an opening at the top, out of which he can conveniently put his head. A heated iron is placed in the inside, and when the powder is thrown on the hot surface of the iron, it becomes volatilized, and deposited on the surface of the patient's body. The patient is afterwards to put on his flannel waistcoat and drawers. Very probably it would be quite sufficient to fumigate the inside of the clothes, and let them be put on carefully.

This is a most expeditious mode of impregnating the constitution. Mr. Abernethy has thus cured a venereal sore throat in the short space of sixty hours. When a patient is too weak to rub in mercury, or to bear its internal exhibition, this plan might be very useful.

Besides mercurial fumigations of the whole surface of the body, with a view of affecting the constitution, practitioners place considerable reliance in the efficacy of topical fumigations with the hydrargyri sulphuretum rubrum, for improving the appearance and inducing a healing disposition in many primary as well as secondary venereal ulcers, which are backward in yielding to the ordinary employment of mercury. In the shops may be procured an apparatus, consisting of a stand, an iron heater on which the mercurial powder is to be thrown, and a tube for conducting the smoke to the part affected.

The established doctrine is, that mercury cures the venereal disease, not on any chemical principle, but by exciting, in the constitution and parts affected, a particular action, which overcomes and removes the venereal one.

In the general observations, at the commencement of this chapter, some of the leading Hunterian principles, on which the treatment of the venereal disease is to be regulated, have been already mentioned. According to Dr. Adams, whenever we have cured a patient of the first local symptoms, we may assure him, that as long as he keeps out of the way of mischief, he is free from all danger of a relapse in those parts, which have been cured; but, we cannot pretend to inform him whether the disease will yet appear in his throat, skin, or bones. This uncertainty must remain, for a few months, after the chancre, or bubo has been cured.* So when the disease has reappeared in the skin, or throat, and been cured, we cannot pretend to say, whether it will afterwards shew itself in the bones, though we know, that it will not again do so in the skin or throat. But, when the primary complaints, and the secondary in the skin, throat, and bones, have all appeared, and been cured, we may regard the patient as free from all danger of future symptoms from the same stock of infection. As I have already related, the Hunterians explain most of the preceding circumstances, by supposing mercury to have no power of curing the disposition to the disease, but, only the action, or the palpable and perceptible forms of the distemper; and, by laying it down as a law of this disease, that the same order of parts can never be affected more, than once, from the same stock of infection.

With respect to nodes, mercury is frequently incapable of removing the whole of the swelling. In such cases, blisters applied in the vicinity, and kept open with the savin cerate, are highly beneficial.

It is impossible, in a work of this sort, to treat of the whole of this extensive subject. Phymosis, paraphymosis, gonorrhœa, hernia humoralis, &c. will be explained in the second part of the publication.

CHAP. XXXV.

WHITE SWELLINGS, AND OTHER AFFECTIONS OF THE JOINTS.

WHITE SWELLINGS.

THE large joints, such as the knee, ankle, wrist, and elbow, are most exposed to the attack of this alarming malady. In the first stages of the disease, the skin is not at all altered in colour. The swelling sometimes yields in a certain degree to pressure, but it is in general sufficiently firm to make the uninformed examiner believe, that the bones contribute to the tumor. Whatever degree of pain may attend the early stage of the disorder, it particularly affects only one point of the articulation, in general its centre, or the head of the tibia. In most cases, the tumor is at first very trivial, although the pain may be severe. When the knee is affected, a fulness is first observed to occupy the little hollows, which are naturally situated on each side of the patella. This prominence augments, and the whole articulation soon becomes every where very palpably enlarged.

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* Observations on Morbid Poison, p. 163, 164, edit. 2; and the Comment. on Hunter's Treatise on the Venereal Disease.

As the patient cannot bear the weight of his body on the affected limb, he gets into the habit of only touching the ground with his toe, and thus the knee is generally kept a little bent, and the power of completely extending it again is soon lost. In advanced cases, the knee is always found in a permanent state of flexion.

At length, the diseased joint attains an enormous size; but, the skin is not materially affected, a shining smoothness, and a few varicose veins, being the only uncommon appearances. The skin, however, cannot now be pinched up into a fold, as it could in the early stage of the disease.

At last, abscesses form around the joint, and their contents are discharged through ulcerated apertures. These openings sometimes heal after a time, and other similar abscesses take place at a different part of the tumor.

The patient's health gradually becomes impaired by the local disease. His appetite fails; he cannot sleep at night; his pulse is slow and frequent; he has profuse perspirations; and his bowels are often disordered with diarrhœa. Under such smptoms, dissolution follows, sooner or later, unless the local disease be relieved.

There is another kind of white swelling, termed *rheumatic*, and it is very different from the *scrofulous* just described.

In the rheumatic, the pain is said never to occur without some swelling being evident, nor does the acuteness of the pain subside, in proportion as the tumefaction increases. On the other hand, scrofulous white swellings are always preceded by pain, which is not so acute after the swelling commences as it was before. In rheumatic cases, the pain is not confined to a particular point; but, extends over the whole articulation, and the health is not so much impaired, as in the other instances. I believe, also, the bones do not undergo the morbid alteration, which is peculiar to scrofulous affections of the joints. Rheumatic cases are more frequently cured, than scrofulous ones.

It is a very prevailing notion, that, in white swellings, the heads of the bones are preternaturally enlarged. I must frankly own, that, deceived by the feel of many diseased joints, and influenced by general opinion, I once imbibed the idea, that there is oftentimes a regular expansion of the heads of scrofulous bones. But, excepting an occasional enlargement which arises from spiculæ of osseous matter deposited on the outside of the tibia, ulna, &c. and which alteration cannot be called an expansion of those bones, I never have been an eye-witness of the head of a bone being of preternaturally large dimensions, in consequence of the disease known by the name of white swelling. I have been in the habit of frequently inspecting the state of the numerous diseased joints, which are annually amputated in St. Bartholomew's hospital, and though I have long been attentive to this point, my searches after a really enlarged scrofulous bone have always been in vain. The change, which the head of the tibia undergoes in many cases, is first a partial absorption of the phosphate of lime throughout its texture, while a soft kind of matter seems to be secreted into its substance. In a more advanced stage, and indeed in that stage, which most frequently takes place before a joint is amputated, the head of the bone has deep excavations in consequence of caries, and its structure is now so softened, that, when an instrument is pushed against the carious part, it easily penetrates deeply into the bone.

A cursory examination of the diseased joint, even when it is cut open, will not suffice to shew, that the bones are not enlarged. I dissected one some time ago, and, on first looking at the parts, the swelling had every appearance of arising from an actual expansion of the bones. An intelligent medical friend, who was present, felt the ends of the bones after the integuments were removed, and he coincided with me, that the feel, which was even now communicated, seemed to be caused by a swelling of the bones themselves. But, on cleaning them, the enlargement was demonstrated to arise entirely from a thickening of the soft parts.

I am happy to remark, that Mr. Crowther, in the last edition of his book on the white swelling, has renounced the doctrine of the heads of the bones being enlarged. This gentleman informs us, that his own practice has afforded him some opportunities, after the removal of the limb, of investigating the actual condition of the joint; and the cases, as far as external examination could determine, would have led any one to imagine, that the bones were spread; they certainly seemed to be so; yet, upon accurately investigating them after dissection, they were not, in fact, in the least increased in bulk.

Mr. Lawrence appears to have ascertained by dissections, made as long back as four years ago, that the common notion of the heads of the bones being enlarged, is unfounded and erroneous.*

The soft parts undergo a material change; they are both thickened and softened; and there is a large quantity of a viscid fluid intermixed with the cellular substance. In short, the whole texture of the cellular membrane becomes thicker and softer than in the healthy state.

In the cavity of the joint, we sometimes find a quantity of curdy matter, and the cartilages absorbed in various places.

TREATMENT OF WHITE SWELLINGS.

White swellings, whether of that description, which has been termed rheumatic, or of that, which is denominated scrofulous, present themselves in practice in two very different stages: in one, there is a degree of acute inflammation about the joint; in the other, the affection is entirely chronic.

Topical bleeding, and cold saturnine lotions, are certainly indicated when acute inflammation is present, and what is implied by the antiphlogistic treatment may now be advantageously employed. I cannot, however, withhold my censure from such practitioners as lose weeks and months in the adoption of this treatment. The plan is truly useful, as long as the integuments are hot and tender, and there are symptoms of inflammatory fever; but no sooner is this stage past, than such treatment becomes ridiculously inert, and, by preventing the employment of really efficacious measures, it may even be considered as in some degree conducive to the increase of a most terrible disease.

Some mild cases of white swellings, probably rheumatic, may be cured by using topical applications composed of strong astringents of the mineral and vegetable kingdom. Mr. Russell recommends a solution of alum in the decoction of oak bark.

There are other instances, in which the employment of sea-water as a lotion to the joint is beneficial. I have seen several cases, in which the enlargement has been diminished by this application; but I cannot say, that I have ever known one example, in which a perfect cure was accomplished by it. Sea-air and sea-bathing undoubtedly have very powerful effects on scrofulous affections in general, and most particularly so on these diseases, when situated in the joints.

With respect to electricity, I believe it is of little use in the present cases; in a few instances, it is true, it has seemed to do good; but in others, according to my own judgment, it rather exasperated, than diminished, the disorder.

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* Practical Obs. on White Swelling, &c. by B. Crowther, p. 10—14, new edit. 1808.

Fomentations and poultices I consider perfectly inert, and quite unworthy of the praises, which some writers bestow on them.

The only method of treatment, which my own personal experience enables me to recommend, consists in keeping up a continual discharge of pus from the surface of the joint. In these cases, I am rather inclined to prefer blisters to issues, as being more efficacious; but, when blisters are found to create considerable irritation all over the joint, a caustic issue is to be preferred. The blister should be large, and the excoriated surface dressed with savin cerate, in the manner, which was first introduced into practice by Mr. Crowther. Some practitioners recommend blistering first one side of the joint, then the other, alternately, for a considerable time. Thus, while one blister is healing, the other is forming. This method is said to be attended with considerable success.

Caustic issues are usually placed on each side of the joint, and, in knee-cases, they are commonly made as large as half-crowns.

When we consider how much the enlargement of joints, affected with white swellings, depends on a thickening of parts on the outside of the capsular ligament, we cannot wonder, at the great diminution of the swelling, which may often be effected by long-continued friction, for a certain number of hours every day. We know, that this friction is a celebrated plan at Oxford, where many women earn their livelihood by rubbing diseased joints with their hands, for a certain length of time, every day. No liniments, nor any other applications, are rubbed on the part; except merely, a little hair powder, or flour, to prevent the skin from being chafed. This mode is termed *dry-rubbing*.

I have seen some white swellings rendered smaller, by pressure, made with bandages, or strips of adhesive plaster; but, I do not know, that it has ever effected a cure, nor, when we remember the state of the interior texture of the heads of the bones, does it seem likely to do so.

DISEASE OF THE HIP JOINT.

For the purpose of comprehending the whole subject of diseased joints in the present chapter, I enter on the consideration of the hip disease, particularly, as it is very analogous to the disorder, which we have just quitted.

Disease of the hip joint is most commonly met with in children under the age of fourteen; but, no age is exempt from the malady, so that, though children form a large proportion of those subjects, who are afflicted, yet the number of adults, and even of old persons, is also considerable.

The approach of the hip disease is far more insidious, than that of a white swelling. The latter is generally preceded by severe pain, while frequently the only forerunner of the former is a slight weakness and limping of the affected limb. As, at first, there is often no complaint of uneasiness in the hip, while pains affect the knee, it is not uncommon to observe the seat of the disorder mistaken, and applications erroneously made to the latter joint. Even when a fixed pain begins to be felt behind the trochanter, as the joint is not visibly enlarged, the affection is too often disregarded, as one of no importance in young subjects, and as a rheumatic, or gouty complaint in adults. The pain is also not confined to the seat of the disease, but shoots downward in the course of the vastus externus to the knee, and along the outer part of the fibula to the malleolus externus. Many refer their painful sensations to the groin.

Almost as early as the least limping can be perceived, some diminution in the circumference of the leg and thigh has actually taken place. When pressure is made on the front of the acetabulum, pain is excited. Another strong pathognomonic symptom is the elongation of the limb in the incipient stage of the hip disease. This change is easily discoverable by comparing the condyles of the os femoris, the patella, the trochanter major, and malleolus internus, of the diseased limb, with the same parts of the sound one.

This elongation of the lower extremity, in the early state of the case, is a very striking circumstance.

It appears, that Mr. John Hunter used to explain the lengthened appearance of the limb, by the position of the pelvis becoming changed. It is said to assume an oblique posture, with respect to the rest of the trunk, in such a manner, that the affected side of the pelvis becomes lower, than the opposite one.* Dr. Falconer has noticed in his pamphlet on the ischias, that the tuberosity of the ischium, on the diseased side, becomes lower, than that on the other side; but, so far from taking advantage of this fact, to explain the lengthened appearance of the limb, in the incipient state of the hip-disease, he offers other very erroneous explanations of the circumstance.

The natural fulness and convexity of the nates becomes flattened. The glutæus magnus is emaciated, and its edge no longer forms so bold a line, as it naturally does, at the upper and back part of the thigh, in the sound state of the limb.*

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* Crowther on White Swelling, p. 266, new edit.

Though there may be more pain, about the knee, than the hip, at some periods of the malady, the former joint may always be bent and extended, without any increase of uneasiness; but, the thigh bone cannot be moved, without making the patient experience an increase of suffering.

Patients soon get into the habit of keeping the thigh somewhat bent, and it can seldom afterwards be completely straightened.

Such is the first stage of the disease in its ordinary forms, when the health is commonly but little impaired. The second stage of the disease is that, which is attended with suppuration.

The symptoms, which are the forerunners of the formation of pus, are different in different cases. This variety depends on the presence of acute, or only chronic inflammation. When the former occurs, the parts surrounding the joint, become tense and painful; the skin is even reddish, and sympathetic inflammatory fever occurs. As the local pain abates, rigors take place; and a swelling, which very soon points, forms in the vicinity of the joint.

When the abscess is the consequence of that languid kind of inflammation, which usually occasions scrofulous collections of matter, there is not so remarkable an increase of pain in the articulation previously to the occurrence of suppuration. Startings and catchings during sleep, are said to be among the most certain signs of the formation of matter. When the pus forms in this chronic manner, it does not make its way to the surface so quickly as in cases of active inflammation. A large fluctuating tumor forms; but, it does not immediately point.

At last, the limb becomes shortened, and this circumstance, when the retraction is considerable, arises from nothing less, than an actual dislocation of the head of the thigh bone, in consequence of the destruction of the cartilages, ligaments, and articular cavity. The shortening of the limb sometimes happens before suppuration; but, for the most part, after it. There are instances, in which the head of the bone is dislocated, and anchylosis follows, without any occurrence of abscesses at all.

Sometimes, before matter forms, patients are greatly dejected by hectic symptoms. In the suppurative stage, the effects on the constitution always become worse.

The openings, through which the abscesses are discharged, continue in most instances, to emit an unhealthy kind of matter for a long while. The patient either dies of hectic symptoms, or escapes with an anchylosis.

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* I believe these circumstances were first explained in Ford's Obs. on the Disease of the Hip Joint.

Morbid anatomy evinces, that the disease, in its advanced state, produces a destruction of the ligaments and cartilages of the joint; the ossa innominata, composing the acetabulum, are softened in texture, and have large portions deficient in consequence of absorption. The head of the os femoris is also frequently affected in the same way, and sometimes dislocated on the dorsum of the ilium, large abscesses occasionally surrounding it.

The remote causes of the hip disease are often indiscoverable. A scrofulous habit, external violence, and lying on the damp ground in summer, undoubtedly frequently contribute to the production of the disease.

TREATMENT.

From the analogy, between the white swelling and hip disease, it is easy to perceive, that the two cases ought to be treated on similar principles. Every thing, said on this subject, in the preceding part of the chapter, is, for the most part, applicable here.

However, though I have thought blisters most efficacious in checking disease of the knee, caustic issues excel in hip cases. The benefit, resulting from both sorts of applications, is to be imputed partly to the counter irritation, and partly to the discharge, which they occasion.

The proper situation for the issue is in the depression just behind and below the trochanter major, and when the patient is an adult, its size should be somewhat larger, than that of a half crown.

The Bath water has been much extolled in these cases, as an external application. Patients, who try it, are put into a warm bath. It is very probable, that its efficacy has been much exaggerated, and that many of the cases, stated to have been cured by it, have been gouty or rheumatic affections.

OF CARTILAGINOUS SUBSTANCES IN JOINTS.

Preternatural cartilaginous bodies in the joints are seldom formed, unless the articulations concerned have, some time or another, suffered a degree of inflammation, or received external violence. The substances, in question, are either attached to a part of the inside of the joint, or are quite unconnected and loose. They are mostly met with in the knee, though we have instances on record of their being found in the articulation of the jaw,[*] ankle,[†] and elbow.[‡] It is in the knee, that they become objects of surgical attention. While they continue by the side of the patella, they cause but little trouble; but, when they slip under the ligament of that bone, or between the same bone and the condyles of the femur, or between the latter bone and the head of the tibia, they impede progression, cause considerable pain, and often excite inflammation.

Cartilaginous tumors only continue to enlarge as long as they are connected by a pedicle with some part of the cavity of the joint. They seldom exceed an almond in size. Mr. Home, however, mentions an instance, in which one became nearly as large as the patella.[§]

In general, we find only one preternatural cartilage; but, Morgagni has seen twenty-five, and, in a periodical work, an example is recited, where fourteen were extracted from the knee, some being as large as small walnuts, and others not so large as peas.[||]

TREATMENT.

If we except making an incision into the joint, we are not acquainted with any certain means of freeing a patient from the inconvenience of this complaint. To this plan, the danger attendant on all wounds of so large an articulation as the knee, is a very serious objection.

Messrs. Middleton and Gooch endeavoured to conduct the extraneous body into a situation, where it produced no pain, and to keep it there by bandages a considerable time, under the idea, that it would not afterwards change its place, and cause inconveniences. The cases, adduced by these gentlemen, are not conclusive, as they had no opportunity of seeing their patients again at the end of a reasonable length of time, and it is not uncommon for cartilaginous substances in the joints to disappear for half a year, and then re-appear, and become troublesome again.

Mr. Hey tried the efficacy of a laced knee-cap, and the cases, which he has adduced, clearly demonstrate, that the benefit, thus obtained, is not temporary, at least, as long as the patient continues to wear the bandage.[¶]

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[*] Prog. de Induratis Corp. Humani, part 5; and Morgagni, de Sed. Epist. 57, art. 15.

[†] Morgagni Ep. cit. art. 14.

[‡] Hey's Pract. Obs. edit. 2, p. 349.

[§] See Trans. of a Society for the Improvement of Med. and chir. Knowledge, vol. 1.

[||] London Med. Review, vol. 3, p. 260.

[¶] See Pract. Obs. in Surgery, chap. 9.

Considering the evidence, which we have on this subject, and the perilous symptoms sometimes following wounds of the knee-joint, I think the effect of a knee-cap, or of a roller and compress, ought to be generally tried, before having recourse to excision. I say generally, because the conduct of the surgeon ought, in such cases, to be adapted to the condition and inclination of the patient. If a man is deprived of his livelihood by not being able to use his knee; if he cannot, or will not take the trouble of wearing a bandage; if he is urgently desirous of running the risk of the operation; if a bandage is not productive of sufficient relief; and lastly, if excessive pain, and inflammation of the joint are frequently produced by the complaint, I think it is the duty of a surgeon to operate.

OPERATION.

When we remember, that the disorder is often attended with a degree of heat and tenderness in the articulation; when we recollect, that the danger of the operation is proportioned to the subsequent inflammation; and when we also recal to mind, that, if the wound unite by the first intention, a great deal of the danger is removed; we cannot doubt the propriety of keeping the patient in bed a few days before operating, and of applying leeches and cold saturnine lotions to the articulation. Thus the joint is brought into a perfectly quiet state before the incision is made. A mild saline purgative should also be previously exhibited.

As the cartilaginous body may generally be moved round the joint, the surgeon can choose the situation for his incision. I think Mr. Abernethy's plan is as safe and commodious as any method. This gentleman recommends bringing the piece of cartilage on the inner surface of the internal condyle of the os femoris, where the assistant is to confine it by placing the points of his fingers in a circular manner round it. The integuments are to be drawn to one side, before the wound is made, in order that they may cover the opening in the capsular ligament immediately after the operation. As soon as the cartilage is exposed, it is to be taken hold of with a tenaculum and extracted.

The wound should not be larger than absolutely necessary. After the operation, the limb should be kept completely motionless, and antiphlogistic means be resorted to, for a moderate length of time; for, when the knee-joint becomes much inflamed, in consequence of the excision of extraneous substances, the symptoms may be violent and fatal.*

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* See Med. Obs. and Inquiries, vol. 5, p. 334; and London Med. Review, vol. 3, p. 260.

HYDROPS ARTICULI.

The knee is more subject, than other joints, to dropsical disease. The affection is frequently brought on by severe rheumatic affections, local violence, and excessive friction of the articular surfaces, and irritation of the synovial gland, occasioned by too much walking. When the fluid is not so copious as to produce very great distention of the capsule, a fluctuation is easily distinguishable. Also, if the limb be extended, so as to relax the ligament of the patella, pressing the collection of fluid causes a rising of that bone, and a fulness on each side of it. The disease is commonly not attended with much pain; but, there is a degree of rigidity in the joint.

Mr. Russell has adopted the opinion, that some cases of this kind are venereal, and others scrofulous,* though he has not supported the doctrine on any solid foundation. Hydrops articuli sometimes follows fevers.

Hydrops articuli is entirely a local disease, and does not depend, like hydrothorax, ascites, or anasarca, on a general affection of the constitution.

TREATMENT.

The indication is to excite the absorbents to remove the preternatural quantity of fluid. I never saw any instance, which did not yield to blistering the part, and keeping up a discharge by means of the savin ointment. The operation of a blister may always be very materially assisted by a bandage. Moderate exercise; frictions with flannel, impregnated with the fumes of vinegar; or rubbing the joint with camphorated mercurial ointment; electricity; and mercurial purges; may also assist in effecting a cure.

When hydrops articuli occurs during the debility, consequent to typhoid and other fevers, the complaint can hardly be expected to get well, before the constitution has regained strength.

I have never seen any case, in which the circumstances seemed to justify making an opening into the joint. But, excessive distention, in some neglected cases, might certainly be an urgent reason for performing such an operation. Also, if the complaint should resist all other plans of treatment, and the irritation of the tumor should greatly impair a weak constitution, the practice would be justifiable. A case of this sort is related by Mr. Latta, where twelve ounces of fluid were discharged.* Mr. Astley Cooper has suggested the method of puncturing the swelling with a needle, as being safer, than making a larger opening.†

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* On the Morbid Affections of the Knee, p. 67.

ANCHYLOSIS

Is distinguished into the *incomplete* and *complete*, according as it happens to consist in a mere difficulty, or in an absolute impossibility, of moving the affected joint. It is seldom a primitive affection; but, generally a consequence of some other disease or injury of the articulation. Whenever a joint is kept quite motionless a very considerable time, anchylosis takes place, and its occurrence is materially promoted, when, together with total inaction, there is also an irritation of the articular surfaces. Thus, in all cases of fractures, if the limb is long confined, the joints become affected with a rigidity, or incomplete anchylosis, that can only be removed by exercise, which is to be continued and gradually increased, and assisted with the use of fomentations, liniments, &c.

When a fracture happens near a joint, the inflammation excited always extends to the articulation. In some instances, the ligaments and surrounding parts are merely affected with a stiffness, that renders the motion of the joint difficult; while, in other examples, the inflammation of the articular surfaces occasions their general adhesion to each other, and, of course, a total abolition of motion, or, in other words, a complete anchylosis. The irritation, incident to various articular diseases, may bring on this affection, as for instance, white swellings, sprains, and operations for hydrops articuli, and extraneous substances within the capsular ligament. In such cases, the anchylosis is materially promoted by the immobility, to which the articulation is unavoidably subjected, and it is absolutely incurable, because it is impossible to restore to the articular surfaces, the smoothness, which they have lost. Even should the limb be fixed in an awkward direction, all attempts to break the adhesions are forbidden, because they would bring on such inflammation, as must terminate in an anchylosis again, and perhaps induce caries. Therefore, when anchylosis is the unavoidable consequence of a disease, or may be regarded as the desirable event of it, the surgeon should take care beforehand to place the joint in the most useful position. Thus, it is customary, when the hip, or knee, is likely to become affected with anchylosis, to keep the lower extremity as much as possible in the extended posture. On the contrary, when there is a chance of anchylosis in the finger-joints, or the elbow, these articulations should be kept bent.

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* System of Surgery, vol. 2, p. 490.

† See Medico-Chirurgical Trans. vol. 2, p. 339.

The treatment of incomplete anchylosis comprehends preventive and curative means. Of all prophylactic measures, the most effectual is taking care to move every day the articulation, which is threatened with the disease, and increase the motion in proportion as the suppleness of the parts is augmented. The same practice is also the most efficacious for curing an incomplete anchylosis, and, we are advised to promote its effects by the daily employment of warm bathing, emollient fomentations and poultices, and frictions with oily liniments, Bath water, &c.

In several cases, anchylosis, scarcely deserves the appellation of a disease, being sometimes even the termination of a disease, as of many white swellings, and the distemper of the hip. Anchylosis naturally takes place between the vertebræ of persons advanced in years, and also in our toe-joints, the motion of which is hindered by the soles of our shoes. Popliteal aneurisms, by preventing all motion of the knee, frequently cause an anchylosis of that articulation.*

CHAP. XXXVI.

SEVERAL DISEASES OF THE BONES.

VENEREAL nodes, and the scrofulous change of the bones, have already been noticed.

ABSCESSES AND CARIES IN THE MEDULLARY CAVITIES, AND CANCELLOUS STRUCTURE OF BONES.

When matter forms in the internal structure of a bone, the disease has sometimes been called spina ventosa; but, as many understand by this latter term, a white swelling, I shall not employ it in the present work. The complaint is most frequently met with in unhealthy children, and it begins with a dull, heavy, deeply-seated pain, the limb appearing outwardly quite sound. In general, the disease is not ascertained before the affected bone becomes expanded,* or at least the periosteum thickened, and the surface of the bone rough. Indeed, Mr. Hey compares the appearance of one of his cases with that of a node.† The tibia appears to be most liable to the disorder. At length, the matter arrives beneath the periosteum, and a tumor resembling a deep-seated abscess is produced.

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* See Richerand's Nosographie Chirurg. tom. 3, p. 237, 242, edit. 2.

The disease generally occasions more or less caries. The aperture, by which the matter passes through the lamellated part of the bone, is seldom much larger, than is sufficient for the introduction of a probe.

I have only taken particular notice of one example of this affection, which occurred in the tibia of a scrofulous lad, about fifteen or sixteen years old, who was some years ago in St. Bartholomew's hospital; and I believe, went into the country uncured. The opening was visible, by which the matter issued from the interior of the bone, and the surrounding part was in an exfoliating state.

Suppuration and caries in the interior of bones may follow fevers,‡ and external violence,§ and there are probably other causes which are less understood. Though the abovementioned lad was of a strumous habit, I do not conceive, that the affection of his tibia depended on scrofula; for, it appears to me, that the only really strumous distemper of the bones attacks their heads, and articular surfaces, and is of the nature described in the foregoing chapter.

As soon as the case is ascertained, the matter ought to be evacuated through a perforation made with a small trephine, and such portions of the bone, as are manifestly diseased, should be cut away with knives, chissels, or gouges, as may be most convenient. When this can be completely done, the wound will generally heal without exfoliations. When it cannot be entirely effected, the diseased parts must exfoliate, ere a cure can happen. Cases, exemplifying the success of such treatment, are recorded by Mr. Hey. Unfortunately, it is difficult to know the early existence of the disorder with certainty. Amputation ought not to be practised, unless the immediate preservation of life should be at stake. Bark, wine, good air, and a nourishing diet, are peculiarly necessary in this tedious and debilitating sort of case.

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* See a case described under the name of *Spina ventosa,* by Petit, in his work *Sur les Maladies des os,* and also the article, *Spina Ventosa,* in the *Encyclopédie Methodique, Partie Chirurgicale.*

† See Pract. Obs. in Surgery, p. 26, edit. 2.

‡ See Whateley's Description of an Affection of the Tibia induced by Fever, and the first case in Hey's Pract. Obs. p. 26, edit. 2.

§ See Hey's third Case, p. 34.

No doubt, many cases of necrosis have been mistaken for the preceding complaint.

Analogous to the foregoing disease is the formation of matter in the medullary structure of the cranium, in consequence of a violent blow on the head. As the matter is secreted, it spreads throughout the diploe, and, at length, portions both of the external and internal table of the skull are absorbed, so as to form numerous foramina, and allow the pus to insinuate itself between the cranium and dura matter, or beneath the pericranium. In this case, an opening should be made with the trephine very early, in order to prevent the diffusion of mischief.

NECROSIS, EXFOLIATIONS, &C.

The death of a whole bone, or chief part of one, is termed *necrosis*; the same affection of a smaller portion is denominated an *exfoliation*, or sometimes very improperly a *caries*.

While necrosis of the bones may be compared with sphacelus of the soft parts, caries rather bears a resemblance to ulceration. Caries mostly affects the spongy parts of bones, as the articular extremities of the cylindrical bones, and the short thick bones, like those of the carpus and tarsus. On the other hand, necrosis only attacks the most dense and compact parts of the bones, as the broad flat bones, and the middle portions of the long cylindrical ones. In the last description of bones, necrosis never extends itself to the articular surfaces.

Necrosis of the flat bones is most frequently exemplified on the skull. When in consequence of a wound with loss of substance, a part of the cranium is denuded, without being contused, the exposed surface may become covered with granulations, and no portion of it perish. But when the bone has suffered contusion, as well as exposure, a part of it is apt to fall into the state of necrosis, which, however, may not extend more deeply than the external table. In other instances, in which the blow, besides denuding the outer surface of the skull, has been such as to detach the dura mater also from the internal table, the whole thickness of the bone is affected with necrosis. Exfoliations of both tables of the skull frequently happen in consequence of injuries of the head, and the effects of syphilis. No sooner is a part of the skull dead, than it becomes an extraneous substance, hindering the cicatrization of the wound, or ulcer, and nature endeavours to rid herself of it. The absorbents remove the particles of matter, forming the bond of union between the living and mortified bone, and the latter becoming sufficiently loose, the surgeon takes it away with his forceps. In particular instances, the natural process of separation is so slow, that the practitioner exposes the dead part by incisions, and removes it with suitable instruments.

The cylindrical bones are sometimes affected with superficial necrosis of little extent, resembling ordinary exfoliations of the outer table of the cranium. But the most important cases are those, in which the main part of a long bone, like the tibia, or os femoris, is attacked with necrosis. When, after deep-seated pains about the middle of a limb, the bone swells, the skin inflames, and abscesses are produced ending in fistulæ, which emit an abundant thin discharge, the nature of the disease is clear, and still more clear, if with a probe the roughness, or moveableness of the dead bone can be felt. In this affection, nature appears to surround the dead bone on every side with a deposition of new osseous matter, and in time, the mortified portion is removed by the absorbents, provided it does not make its way to the surface of the body, and ultimately admit of being taken away. The process of nature, however, in cases of extensive necrosis of the cylindrical bones, requires further investigation. We do not positively know, whether the deeper lamellæ alone die, while the external ones are separated and converted into the outer bony shell, as Scarpa and Richerand maintain; or whether the whole thickness of the bone perishes, and the new bony case is produced by the periosteum, as M. David, and Troja believed, and the observations of Mr. Macartney tend to confirm.*

One thing appears certain, that necrosis of the cylindrical bones does not follow injury of the medullary membrane so constantly, as many writers would lead one to suppose. Mr. Hey has repeatedly trephined the tibia, and cut and sawn away its inner lamellæ, without a mortification of that bone being induced.†

Sometimes purulent matter accumulates between the external bony shell and the dead bone, and, at length, by causing the absorbents to produce apertures in the former, it arrives immediately under the skin, and after the abscess bursts, or is opened, continues to be discharged through orifices, which become fistulous. When a probe is introduced, it occasionally passes down to the dead bone, and the surgeon can ascertain, whether the latter is moveable within the external bony tube. If he finds it so, the time is come when it is his duty to endeavour to extract the mortified portion by an operation, which consists in cutting down to the outer bony tube, and removing such a portion of it with a trephine, or one of Mr. Hey's saws, as will enable the operator to extract the contained piece of dead bone. Richerand strongly insists on the advantage of making the opening, not over the centre, but towards the lower end of the part affected with necrosis, as in this way it will be necessary to cut away less of the external bony tube.

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* Richerand, Nosographie Chir. tom. 3, p. 148, edit. 2.

† Pract. Obs. in Surgery, chap. 2.

In short, the outline of the treatment of necrosis consists in trying to prevent the first inflammation of the soft parts from becoming so alarming, as to threaten the patient's very existence; in supporting the strength, when weakening sores and abscesses occur; in taking away the dead bone when it tends outward, and protrudes through the skin, or when it is included in a bony investment, as soon as ever it becomes loose enough or can be separated by any safe operation; and in promoting the action of the absorbents, when the dead bone lies firmly within the cavity of the new one. Mr. Abernethy and Mr. Crowther recommend for the latter purpose applying a blister, and keeping it open with the savin cerate. The efficacy of such practice is curious, if it be true, that the absorbents prove more active, when all the sores can be healed, as some practitioners decidedly believe. These cases are frequently so tedious, and impair the health so much, as to render amputation inevitable.

EXOSTOSES.

Excluding from consideration venereal nodes, all osseous tumors growing from bones, are termed *exostoses*. In many cases, the affection appears to be idiopathic. Some persons seem to have such a tendency to the disorder, that common injuries, which would create no particular consequences in ordinary constitutions, are followed in them by the growth of bony swellings. It has been recommended in such cases, to give muriatic and other acids, and to forbid all food containing earth. I rather suspect the disorder is quite beyond the reach of medicine. Idiopathic exostoses are formed with slowness, but cured with difficulty. The same may also be said of such as arise from local causes. They do not often become carious. They mostly remain stationary a long while, and acquire the hardness of ivory. The only inconveniences are generally those, which depend on the size and weight of the tumor. But, sometimes exostoses produce severe and fatal symptoms, as when they grow in the orbit and displace the eye, or in the pelvis and press on the bladder. Believing that medicine has no power over exostoses, I shall only state, in addition to the foregoing observations, that such swellings may frequently be removed by surgical operations, the propriety of which, however, must always be determined by the situation of the disease, and the inconvenience, which the tumor excites.

MOLLITIES OSSIUM.

The bones sometimes become softened throughout their texture, and preternaturally flexible. The morbid affection is connected with a deficiency of lime in the altered bones, which yield to the actions of the muscles, and bend in various directions. The case of Mad. Supiot is the most remarkable, that we have on record: her thigh bones were so pliable, that her feet could easily be laid on each side of her head; almost every bone in her body was affected in the same way, so that, before she died, she had become deformed in a most extraordinary manner, and was two feet two inches shorter, than she was originally, before being affected with the disease.[*]

This case may be considered quite beyond the reach of medical skill.

FRAGILITAS OSSIUM.

There is on record an instance, in which the bones became unusually brittle, before the morbid flexibility of them took place.[†] A remarkable fragility of the bones has likewise been observed to occur in the advanced stages of ulcerated cancers, and I have heard, that a similar affection has been observed in cases of fungus hæmatodes. I am not acquainted with any treatment, that has been found to check or remove fragilitas ossium. The proportion of animal matter in the bones becoming less, and the quantity of lime greater, as we advance in years, our bones naturally acquire brittleness with age; but, this can never be compared with the morbid fragility described by writers.

RICKETS.

Weak and particularly scrofulous children are subject to this disorder, in which the bones, in consequence of a deficiency of lime in their structure, are bent by the weight of the body, or the action of the muscles. In infants, who are too young to walk, the latter cause is often sufficient to make the bones, particularly those of the lower extremity, deviate from their natural figure.

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[*] Morand in Mem. de l'Acad. des Sciences, an. 1763.

[†] See Gooch's Chirurgical Works, vol. 2, p. 393.

The curvature of the bones, occasioned by rachitis, is only the natural one in an immoderate degree; for, as the ordinary curve of the bones of the limbs is determined by the weight of the body, or the action of the muscles, the same causes, in ricketty subjects, merely produce a greater effect, in consequence of the bones being more flexible.

While the heads of ricketty children are generally large, the dimensions of the chest and pelvis are often preternaturally small, from the distortion of the spine, the unusual flatness of the ribs, and the approximation of the sacrum to the pubes. The consideration of the symptoms, depending on the manner, in which the various viscera are affected by such changes, more properly belongs to the physician, and I shall not enlarge upon this part of the subject.

Besides the preceding appearances, ricketty children are observed to have flabby flesh, hard swollen bellies, and large joints. The disorder is likewise frequently attended with emaciation, and disease of the mesenteric glands. If we except a few cases, like that of Madame Supiot, which I have mentioned in speaking of mollities ossium, rachitis never begins in adults; but, commonly makes its first attack in infants under three years of age.

The quantity of the phosphate of lime, which subsides in the urine of ricketty patients, is stated to be considerable.*

There are various mechanical contrivances sold in London for supporting ricketty bones, and gradually restoring them to a straight figure. It is not necessary to offer here a description of any apparatus for the purpose. Bark, tonic medicines in general, and cold sea-bathing, improve ricketty children, by strengthening the system; for, in proportion as this happens, the phosphate of lime becomes secreted in a more regular manner, and with the aid of mechanical contrivances, very great deformities are gradually removed. In all the three above-mentioned disorders, as there seems to be a want of earth in the texture of the bones, it has been proposed to give internally the phosphate of lime.

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* Richerand, Nosographie Chirurg. tom. 3, p. 160, edit. 2.

CHAP. XXXVII.

FRACTURES.

FRACTURES are of two principal kinds, viz. *simple* and *compound*.

By a *simple* fracture is implied, a division of one or more bones, without any external wound, caused by the protrusion of the ends of the fractured bones. By a *compound* fracture is meant a breach in the continuity of one or more bones, together with a laceration of the integuments, which laceration is caused by the protrusion of one, or both of the ends of the fracture.

To these divisions of the subject some add a third, calling that fracture *complicated*, which is attended with several breaches of continuity in the injured bone, and with the wound of any large nerve, blood-vessel, &c.

Fractures are also distinguished into *longitudinal*, *transverse*, and *oblique*, according to the direction, in which they run.

SIMPLE FRACTURES.

The symptoms of fractures are exceedingly various, according to the bones which are broken; and, though almost all writers have indiscriminately mentioned loss of motion in the injured limb, deformity, swelling, tension, pain, &c. as forming the general diagnosis of fractures, yet it is easily comprehensible by any one acquainted with the structure of the body, that numerous fractures cannot prevent the motion of the part, or occasion outward deformity; and every surgeon must know, that though at first there may be pain in the situation of a fracture, no swelling and tension take place till after a certain period.

When, therefore, a limb is broken, and the event is not manifest from the distortion of the part, it is proper to trace with the fingers the outlines of the suspected bone, and, wherever any unusual pain occurs, or any unnatural irregularity appears, to try if no grating, or *crepitus*, can be felt, on endeavouring to make one end of the bone rub against the other. When the os humeri, or os femoris, is the subject of injury, a crepitus is felt almost as soon as the limb is touched, and in the case of the the thigh, there is a considerable shortening of the extremity, unless the fracture be of the transverse kind. But, when there are two bones, as in the leg and fore-arm, and only one is broken, the other continues to prevent the limb from being shortened, and thrown out of its natural shape, so that a crepitus can only be felt by a proper examination with the fingers. I am aware, that considerable harm, and great unnecessary pain, have been occasioned in the practice of surgery by an over-officious care to feel the grating of fractured bones, and whenever the case is sufficiently evident to the eyes, I cannot refrain from censuring such practitioners as indulge their own ill-judged habits at the expence of torture to the unfortunate patient. A fracture is an injury, that is necessarily attended with considerable pain, and followed by a great deal of tension, and to increase these evils by rough handling of the part is, above all things, cruel, and, I would add, unsurgical.

In cases of fractures, the muscles of the limb are often affected with involuntary spasms, which put the patient to great pain, and when the thigh-bone or arm-bone, or both bones of the leg, or fore-arm, are broken, occasion great distortion, while the violence of each spasm continues.

PROCESS BY WHICH FRACTURES ARE UNITED.

The steps of nature, in the union of broken bones, are very similar to those, which she pursues, in the union of wounds of the soft parts. The vessels, ramifying on the ends of the fracture, first effuse coagulating lymph. This gradually becomes vascular; and as its vessels acquire the power of depositing earthy matter, it is ultimately converted into new bone, termed *callus*, which becomes the bond of union between the two portions of the fractured bone.

In order that the first connecting substance may speedily become organized, and fitted for the formation of callus, nothing is so very favourable as perfect quietude. Hence, the chief surgical indication in the treatment of fractures, after the ends of the bones are replaced, is to keep them perfectly motionless: nature completes the rest. Different bones require different lengths of time to become firmly united; the ribs and clavicle unite as soon as any; the os brachii is commonly tolerably firm in five weeks; but, the bones of the leg and the os femoris seldom become perfectly strong in less than six weeks. These calculations refer, however, to adults: for, in children fractures are cured much more quickly, than in grown up persons. The more vascular the bones are, the sooner is the union of their fractures accomplished.

GENERAL PRINCIPLES IN THE TREATMENT OF FRACTURES.

Relaxing such muscles, as have the power of displacing the ends of a fractured bone, very much facilitates the reduction. A proper position is, indeed, the first thing to be attended to in almost all cases, in which the broken extremities of the bone are not in even contact. The muscles are the powers, which cause the displaced condition of the fracture, by drawing that end of the bone, which is most moveable, out of its proper position, in regard to that, which is most fixed. Hence, in the extremities, the lower ends of fractures are those, which are truly displaced by being drawn upward, or to one side, by the action of certain muscles, which have their origin and insertions both above and below the situation of the breach of continuity. The muscles, therefore, which have the power of displacing the lower ends of such fractures, are the powers, which we ought principally to endeavour to counteract. In oblique fractures, it is much more difficult to keep the ends of the bones in a proper state of coaptation, because two oblique surfaces make no mechanical resistance to that effect, (viz. the retraction of the lower portion of the broken bone), which the strong muscles have a continual tendency to produce.

But, relaxation of the muscles, which have the greatest influence over a fracture, is not only to be observed during the time when the surgeon is setting the broken bone: it is to be strictly adopted throughout the whole cure, at least, until the two ends of the bone have become firmly united together. Were this plan not to be followed, the fracture would very soon be displaced again by muscular action.

The principle, from which the utility of relaxing muscles in these cases arises, is the fact, that every muscle can only contract to a certain degree of shortness: and that in proportion as its origin and insertion become approximated, it loses both the power and disposition to act in an involuntary manner.

The reflecting reader may inquire, what particular position can relax every muscle connected with a broken bone? The same position, which relaxes the flexors, seems to have quite an opposite effect on the extensors. The answer is, that no posture will completely relax every set of muscles in every instance; and, in this circumstance, the joints must be placed in the middle state, between perfect flexion and perfect extension, as in this manner, though complete relaxation is not effected, most of the muscles will not be in a state of tension. When, however, every muscle, having the power to displace a fracture, can be relaxed, the others, which have no power over the progress of the case, may be neglected, and the posture determined accordingly. Thus in the fracture of the thigh, where we cannot perfectly relax every muscle capable of disturbing the fracture, we place the hip and knee-joints in the mid state, between perfect flexion and extension: in the fracture of the patella, where we can relax every muscle, which can resist the object of the surgeon, we regulate the posture, without any regard to muscles, which have no influence over the fracture.

The proper positions for particular fractures will be noticed in the second part of this work.

Having relaxed the muscles according to the above principles, and placed the ends of the fracture into as even a situation, in regard to each other, as the nature of the case will allow, the next object is to keep them securely and quietly in this state, until they have become firmly united.

Incapacitating the most powerful muscles by position, is one great means towards this measure. But, in certain constitutions, almost all the muscles of the injured limb are continually acting in a violent, involuntary, and spasmodic manner. Such patients, if young and robust, should be bled, and should always take an opiate as soon after the occurrence of the accident as convenient.

But, much as position facilitates the favourable union of fractures, other means are necessary for maintaining the ends of the broken bone in their proper situation, and in a perfectly quiet state. Mechanical contrivances are employed to give that degree of support to the limb, which the breach of continuity in the bone, or bones, has taken away. Instruments, called splints, are applied for this purpose, so as to form, as it were, a kind of steady, unyielding case for the limb. Splints ought to be made of strong materials, and of a sufficient length to reach beyond the two joints nearest the fracture, and they ought to be adapted in shape to the contour of the limb. They are generally secured with straps, or tapes.

Since splints, however, are hard, and would give pain, if firmly applied to the limb without the intervention of soft materials, it is customary to place a piece of the emplastrum saponis immediately over the fracture, and to apply, what is termed, an eighteen-tailed bandage, between which latter and the splints, are also interposed pads filled with tow, or any other soft substances. Compresses are generally placed in situations under the splints, where the pressure from such hard instruments is likely to give most pain.

When there is much swelling before the fracture is set, surgeons generally apply cold saturnine lotions instead of a plaster for the first few days; and the linen employed for this purpose can be kept sufficiently wet (without taking off the splints) by squeezing the lotion out of a sponge into the interspaces between them.

The great parade in making violent extension, in order to reduce fractures, is quite abandoned by the moderns. When the muscles are relaxed in a scientific manner, the ends of the fracture may, in general, be put into a state of coaptation with the greatest ease, and very little extension is necessary. Many fractures are not in the least displaced.

In general, fractures of the arm and fore-arm are firmly united in about a month; while those of the thigh and leg require about six or seven weeks. When the union does not take place, after a reasonable length of time, the surgeon should endeavour to ascertain the cause. This may sometimes be imputed, either to the ends of the fracture not being in apposition;* to the part having been moved and disturbed too much; to the advanced age of the patient; or to a general languor and inertia of the constitution.

In the first and second of these cases, the bone should be set again, and kept quite motionless. When the patient is very old, the use of splints is to be continued a long while, as, in such subjects, it is often several months, before fractures are united, and cordial medicines ought to be prescribed.

When several months have elapsed, without an union of the fracture being effected, and there is reason to apprehend the formation of an artificial joint, surgical writers join Celsus in recommending the ends of the broken part to be firmly rubbed against each other, with a view of making them inflame and grow together. On the same principle, some surgeons have allowed their patients, with broken legs, or thighs, confined in splints, to get up, and walk about. As soon as the necessary irritation has been produced, the limb is to be kept motionless a sufficient length of time.†

If such plans fail, it has been proposed to cut down to the broken part, and rasp, or saw off the ends of the bone, and then treat the case, like a recent compound fracture. The latter operation was first devised, and practised with success, by that excellent surgeon, Mr. Charles White, of Manchester, in an example, in which the humerus could not be united by ordinary methods; and scraping the fracture was successfully performed by the same gentleman for the cure of an old fracture of the tibia.*

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* A case of this kind is recorded in the Dictionary of Practical Surgery, art. Fracture.

† See Cases in Surgery by C. White, F.R.S. p. 75.

I have seen the operation of sawing off the ends of a fractured humerus, practised without success by Mr. Long in St. Bartholomew's Hospital. Richerand informs us, that, in the only instance, in which he had an opportunity of seeing such an operation, the patient died on the sixth day.†

On the other hand, Mr. Charles White's cases are highly favourable to the practice. Mr. Rowlands, of Chester, and other surgeons, have likewise found the operation answer. The latter gentleman performed it on the thigh bone, by cutting down to the fracture between the rectus and vastus externus muscles, and placing a strong plate of tin under the ends of the bone, when the saw was used. It was found necessary to make a transverse incision, through a great part of the vastus, in order to facilitate the removal of the lower end of the fractured part; and, though Mr. Rowlands succeeded in his objects, the case was attended with such difficulties, that he expresses himself to be undecided, concerning the propriety of advising the operation to be undertaken by others.‡

A surgeon of Philadelphia is said lately to have discovered a milder and safer practice, which consists in making the ends of the bone inflame and suppurate by means of a seton, and then applying splints. A disunited humerus is stated to have been thus cured.§

CHAP. XXXVIII.

COMPOUND FRACTURES.

A COMPOUND fracture is accompanied with a wound of the integuments, caused by a protrusion of the end of the broken bone.

When the wound is large and lacerated, when the bone or bones are splintered into several pieces, and when the neighbouring muscles have suffered a violent degree of contusion, the case must be considered as extremely dangerous, and the brightest talents are required for the direction of treatment.

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* See Cases, p. 69—79.

† Nosographie Chirurgicale, tom. 3, p. 39, edit. 2.

‡ See Medico-Chirurgical Transactions, vol. 2, p. 47.

§ See Richerand's Nosographie Chirurgicale, tom. 1, p. 56, edit. 2.

A limb, in this condition, submitted to the inspection and judgment of the discerning and scientific practitioner, presents to him one of the most difficult cases, requiring a sudden decision, that is to be met with in surgery. Under these circumstances, the loss of one quarter of an hour often determines the event of the case in a fatal manner.

So great and considerable an injury, inflicted upon parts endued with life and sensibility, capable of inflammation, suppuration, and gangrene, cannot be expected to take place, without being followed by the most severe effects of constitutional sympathy. Let us picture to ourselves, that an experienced surgeon has decided it to be most prudent to attempt the preservation of a limb, which has suffered a compound fracture; let us suppose, that he has adopted the ablest method of treating the case; the fracture being placed as nearly in its natural situation as circumstances will allow, and the wounded integuments brought nicely into contact by means of adhesive plaster, in order that the union of the wound by the first intention may succeed. Perhaps, the case may take so fortunate and favourable a course, that the degree of local inflammation shall not be sufficiently extensive and high to prevent the adhesive inflammation from uniting the external wound; and, whenever there is little local inflammation, the sympathetic fever is always proportionally moderate.

The primary grand object in view, in all cases of compound fractures, is to convert them into simple ones, by uniting the external wound of the integuments as speedily as possible: an object which, from the laceration and contusion present, is so often frustrated.

Let us represent to ourselves another case, in which the local violence is followed by higher inflammation, so that the wound has not united by the first intention, and suppuration has been the consequence. In this example, a considerable degree of sympathetic fever is likely to take place, and very great power in the constitution will be necessary to bear the irritation, and the copious discharge, which is likely to come from the wound for a great length of time. Sometimes, in this state, the constitution, impaired and weakened by the local disease, is attacked by hectic symptoms; fresh irritation happens in the fracture; large suppurations take place under the fascia, which require puncturing, and the patient is thus brought to the lowest condition, which must soon inevitably conclude, if it is not in the power of the surgeon to make a prompt attempt to alter the nature of the case. At other times, the patient's constitution holding out, the suppuration in the wound is soon accompanied with the formation of granulations, and cicatrization follows.

Let us consider a third case, in which the violence done to the limb has been more severe, so as to be followed by a speedy mortification of the whole extremity, and death of the patient. Here, perhaps, had the limb been sacrificed, and amputation been performed immediately after the receipt of the accident, the patient's life might have been preserved. But, no sooner have the symptoms of gangrene made their awful appearance, than experience forbids the recourse even to amputation, and the patient is, as it were, out of the reach of surgical aid. Hence arises the absolute necessity of determining *primâ facie*, the propriety, or impropriety of attempting to preserve a limb, which has met with a compound fracture. When the appearance of inflammation takes place (which quickly happens), when violent throbbing and pain affect the whole limb, the operation is too late, and it would only be making an increase of the patient's suffering to attempt it, as gangrene of the stump would be inevitable. There are then two grand moments always to be observed, and profited by, in cases of compound fractures, when the surgeon has it in his power to decide, whether it is most advisable to try to preserve the limb, or to sacrifice it for the sake of the patient's life.

The one is immediately after the occurrence of the accident, and before an inflammatory and gangrenous tendency in the limb has had time to form.

The other is after the subsidence of the first inflammatory symptoms consequent to the injury, when the constitution seems incapable of bearing any longer the great irritation and immense discharge from the wound, and when hectic fever seems more likely to close the patient's existence, if a further perseverance in an attempt to save the limb be made, than that the object in view should be accomplished.

The treatment of a compound fracture is similar to that of a simple one, only a more rigorous attention to quietude and diet is necessary on the part of the patient, and a more vigilant care on the part of the surgeon. The limb must, as in the simple fracture, be placed in a relaxed position; the fracture, if displaced, must be reduced as speedily as possible; the limb must be laid upon a splint, long enough to keep steady the two nearest joints, and having upon it a soft pad, filled with tow, and an eighteen-tailed bandage. The wound must then be approximated, to give it an opportunity of re-uniting by the first intention, which, when it happens, is a most desirable circumstance, as the fracture is immediately converted into a simple one. When the wound suppurates, it must have such dressings as circumstances require, care being taken, that, at each application of them, the fracture be disturbed as little as possible.

Though one might, in cases of compound fracture, generally be induced to have recourse to phlebotomy to combat the local inflammation, it is found by experience, at least in London, to be ultimately prejudicial; it weakens the constitution too much; for, great powers are required in the system to bear the very long and copious discharge of matter, which often ensues.

Indeed, compound fractures do so much better in the country, than in this large metropolis, and patients bear so much better the rigorous employment of antiphlogistic measures, that it is right to attempt the preservation of numerous limbs out of town, which in London would require amputation.

CHAP. XXXIX.

DISLOCATIONS.

WHEN the articular surfaces of bones are thrown out of their particular places, the accident is termed a *dislocation*, or *luxation*.

Dislocations are divided, like fractures, into two principal kinds; viz. *simple* and *compound*: simple, when there is no external wound communicating with the cavity of the dislocated joint; compound, when the injury is attended with a wound of this description. Luxations have also been distinguished into *ancient*, and *recent*; *complete*, and *incomplete*; *primitive*, and *consecutive*.

Such joints, as admit of extensive and various motions, are generally the most liable to dislocations, as, for instance, the shoulder, and other orbicular articulations. In the ginglymoidal joints, which only move in two opposite directions, luxations seldom happen. In the latter articulations, the articular surfaces are large and mutually adapted to each other, while the ligaments, holding them together, are numerous and strong. If we put out of consideration partial dislocations of the astragalus from the os naviculare, we never meet with, what have been termed, *incomplete* luxations, except in ginglymoidal joints, like the ankle, the knee, and the elbow.

The distinctions *primitive* and *consecutive*, much adopted by the celebrated Desault, are highly necessary in considering the nature of dislocations; for, the practitioner should understand well, that, when the head of a bone has entirely escaped from the articular cavity, it may afterwards have its situation materially altered by the action of the muscles. When it remains in the place, into which it was originally forced, the luxation is called a *primitive* one; but, *consecutive*, when the head of the bone has been drawn by the muscles out of the situation into which it was first thrown.

The diagnostic marks of dislocations chiefly consist of circumstances arising from the functions of the affected joint being interrupted; and the lodgment of the articular extremity of a bone in an unnatural situation, and among parts, which it compresses and renders painful. Hence, there is a loss of motion in the joint; the limb, or part, is either shortened, lengthened, or distorted to one side, according to the kind of dislocation; the pressure of the dislocated head of the bone on the surrounding parts causes considerable pain, which is immensely increased, when the surgeon moves the limb in order to examine the case. The head of the dislocated bone may sometimes be distinctly felt, forming a preternatural tumor or projection, while, in the situation of the articular cavity, there is an unusual depression, or want of fulness in appearance.

The symptoms, however, of particular dislocations, are not a proper subject for present consideration.

Luxations are almost always produced by external violence, which ruptures such ligaments as naturally restrain the dislocated heads of the bones from being thrown into the particular directions in which, in various cases, they are found to be situated. Even tendons, proceeding over the surface of the joints, are frequently lacerated.

In the ginglymoidal articulations, external violence alone commonly operates in causing a luxation, which likewise is almost always incomplete. But, in the orbicular joints, the action of the muscles has constantly a share in occasioning the accident, which, we know, in these articulations, is invariably complete. Indeed, in the dislocation of the lower jaw, external violence rarely has any concern at all in the production of the accident, and the bone is displaced entirely by the action of the muscles.

Besides the ordinary occasional causes of luxations, it seems proper to mention those, which are called predisposing, and which are either natural, or accidental. The natural, are; the joint admitting of great latitude of motion; the small extent of surfaces, by which the bones touch each other; the laxity and small number of the ligaments uniting them; the shallowness of the articular cavity; &c. The accidental predisposing causes are, paralysis of such muscles, as tend to strengthen the joint; a preternatural looseness of the ligaments, &c. Thus, Boyer mentions a case, where, the deltoid muscle being paralytic, the weight of the arm was alone capable of dislocating the humerus from the scapula; and the same writer adverts to a woman, who could not yawn even moderately, without her jaw being luxated, in consequence of a looseness of the ligaments.*

The degree of danger, in cases of luxations, is very much altered by the circumstance of the case being a simple or a compound one. Simple dislocations, when recent, may commonly be reduced with facility, and they cannot be reckoned at all dangerous cases. Compound dislocations of large joints, on the other hand, are, like compound fractures, frequently attended with danger; and the same nicety of judgment is requisite in determining whether amputation ought to be immediately performed, or an effort made to preserve the limb, as in cases of compound fractures. Most of the remarks, contained in the preceding chapter, are equally applicable here. The degree of violence and laceration done to the soft parts, the great or little chance of healing the wound by the first intention, and the youth or advanced age of the patient, are circumstances, which ought to influence the judgment in this difficult part of surgery. In the country, also, many cases would recover, which in town would not do so, without amputation.

Dislocations of orbicular joints are reckoned less dangerous than those of ginglymoidal ones. In the former articulations, the action of the muscles has a great share in producing the accident, and the soft parts are generally less injured. But, even in joints of the same kind, the extent of the evil is measured by the largeness of the articular surfaces, and the number and strength of the muscles, and ligaments. Hence luxations of the elbow and wrist are generally less hazardous, than those of the knee and ankle, the production of which last cases requires the operation of greater violence.

Though luxations of orbicular joints are generally not so dangerous as those of ginglymoidal articulations, they are more difficult to reduce, because the muscles, resisting the aim of the surgeon, are more numerous and powerful.

The indications, in the treatment of dislocations, are; to reduce the displaced articular surfaces as speedily as possible, and to support the joint with bandages, or splints, until the lacerated ligaments, tendons, &c. have had an opportunity of uniting.

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* See Boyer's Lectures on the Bones, by Richerand. Trans. by Farrell, vol. 2, p. 38, 39.

In cases of compound dislocations, it is a most important point to obtain a prompt union of the wound, as the injury can afterwards only be regarded as one of a simple kind. The lips of the wound are therefore to be accurately brought together with sticking plaster, and the joint kept perfectly quiet in splints.

In order to reduce dislocations without difficulty, it is necessary to consider what muscles have the power of opposing your attempt to bring the dislocated head of the bone into its proper place, and these should be relaxed at the time when the extension is made.

The position in which the limb ought to be placed, until the ligaments have united, ought to be determined on the same principles as in cases of fractures. Dislocations, however, when reduced, are, in general, not so troublesome to keep right as fractures, and are not so easily displaced by the action of muscles.

The modes of reducing particular luxations will be noticed hereafter.

In compound dislocations of the ankle, it must be exceedingly bad practice ever to saw off the protruded end of the bone, as it may always be replaced. What good the proposers of this plan have in view is difficult of conception. Mr. Gooch was inclined to think such practice more likely to be followed by success, when the head of the bone had been long quite out, and exposed to the air.* But no surgeons of the present day ever delay the reduction until the bone can be materially affected by exposure. I much regret, that Mr. Hey has given the least countenance to so objectionable a method: in fact, the only instance of it, adduced from his own practice, is, in my opinion, strongly against it, the patient, after the cure, not being able to walk, but slowly, and weakly, with his toes turned outwards.† This gentleman's use of sutures, in these cases, is also to be condemned.

Old luxations can hardly ever be reduced; for, not only the muscles become permanently shortened, and the articular cavity more or less obliterated, but the head of the dislocated bone acquires adhesions to the parts in its new situation.

Though dislocations are commonly occasioned by external force, they are, now and then, the consequence of disease in the joints. In a foregoing chapter, I have already noticed, how a luxation of the thigh bone is caused, in the disease of the hip, by the destruction of the circumference of the acetabulum, and articular ligaments. We do not often see a dislocation take place in cases of white swellings of the knee; but, it does occasionally occur. Mr. Lawrence told me, that he saw, a few years ago, a child, whose bones of the leg were drawn considerably upwards towards the tuberosity of the ischium, in consequence of disease in the knee, and, within the last twelve months, I have myself met with two or three examples of the same kind.

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* Cases in Surgery, p. 103, edit. 1.

† Pract. Observations in Surgery, p. 375, edit. 2.

I once saw with this gentleman, and Mr. Langstaff, a person afflicted with a diseased knee, whose affected joint could be bent to a very great extent towards each side, and this even when the leg was brought completely forward.

The pressure of the dislocated head of a bone sometimes gives rise to œdema and paralysis of the limb. Desault met with several cases, in which palsy of the arm was occasioned by injury of the axillary plexus of nerves in dislocations of the shoulder. Some of these paralytic affections proved incurable; others yielded to the application of the moxa above the clavicle, or to the employment of strong ammoniacal liniments.*

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* See Œuvres Chir. de Desault, par Bichat, tom. 1, p. 355—357.

END OF THE FIRST PART.

FIRST LINES

OF THE

PRACTICE OF SURGERY.

PART II.

PARTICULAR SURGICAL SUBJECTS.

CHAP. I.

INJURIES OF THE HEAD.

WE shall divide this extensive subject into remarks on superficial injuries; fractures of the cranium; pressure on the brain from extravasation; pressure on the brain from matter; concussion; phrenitis; the operation of trepanning.

SUPERFICIAL INJURIES.

Injuries of the scalp are not free from danger, as the integuments of the head have some connexion with the parts within the skull by means of vessels. Contusions of the head sometimes occasion abscesses beneath the aponeurosis of the occipito-frontalis muscle. The matter ought to be evacuated as soon as its existence is ascertained; and, if possible, the opening should be made in a depending situation.

Contusions of the head, in other instances, produce an extravasation of blood beneath the aponeurosis of the occipito-frontalis muscle. This kind of tumor, when examined by the fingers, communicates a sensation so like that of a fracture, with depression of the cranium, as may be easily mistaken. Mild purges, and the lotion of vinegar and sal ammoniac, commonly very soon occasion the absorption of the effused blood.

Cuts of the integuments of the head, without injury of the skull, are simple wounds, unattended with any peculiarity. They admit of direct union, unless it is interrupted by some incidental circumstance. Many contused and lacerated wounds of the scalp may also be united. The flaps, angles, and detached portions of these wounds, provided they are connected with the rest of the scalp at some point or another, ought never to be removed so as to cause an unnecessary exposure of the cranium; they ought to be carefully laid down, and, in very many instances, they will be found to live and unite to the surrounding part of the scalp. The success of the attempt will depend, in a great measure, on the degree of contusion that has been inflicted.

I shall only mention, on this subject, one additional case, of frequent occurrence, where the integuments of the head become affected with an erysipelatous inflammation, in consequence of a wound or bruise.

Erysipelas, the causes of which are in most cases referrible to derangement in the functions of the abdominal viscera, is a very frequent complication of wounds in general, especially of those in large hospitals, where the bad air, and the crowd of diseased persons together, often induce a disordered state of the primæ viæ. But, in no cases, is erysipelas more strikingly exemplified, than in many wounds of the head. The majority of patients, with such injuries, experience the complaint in a greater or less degree, together with symptoms more or less alarming. The erysipelatous affection is usually preceded either by a dull obtuse pain, or one of a sharp acute kind. The edges of the wound swell, and the tumefaction, from being at first inconsiderable, soon becomes more extensive. The tongue is covered with a yellowish fur; the patient loses his appetite, is troubled with nausea, and vomitings of bilious matter, loathing of food, uneasiness in the situation of the liver, and, in short, all those symptoms, which the Continental surgeons have denominated *gastric*.

If the disease increases, the swelling spreads over the whole scalp, even extends to the face, and has a reddish colour, blended with a yellow tint, particularly, on the face. The redness quickly disappears on the finger being applied; but, returns again immediately afterwards. Frequently the affection is complicated with a doughy œdematous feel, and, in some instances, vesicles, filled with yellowish serum, make their appearance in various places.

The pain in the head grows worse; the skin becomes exceedingly hot; and the pulse is hard, small, contracted, and frequent. The appearance of the wound is less favourable. If the injury is recent, its lips are puffed up and dry, without any secretion. Should it be already in a state of suppuration, the matter is yellowish and fetid. The tension of the scalp is considerable, and, if the attempts at resolution fail, abscesses are formed, and the matter is commonly discharged by openings, which take place behind the ears, in the upper eyelid, or other situations.

When the symptoms are still more intense, delirium and coma ensue.

It is now generally admitted, that there is a real, though an inexplicable connexion, between the gastric organs and the parts affected with erysipelas. This truth is most convincing, when, it is remembered, that, the symptoms rarely become violent without the liver being affected, or even an abscess being formed in it, as Petit in particular ascertained in numerous cases of injuries of the head, in the military hospital at Courtray.

The immortal Bichat thus reasons on this subject: 1. One of the particular effects of wounds of the head is to produce, in the gastric viscera, a bilious disorder, that is evinced by its peculiar symptoms, which in fact precede all the others. 2. Such disorder, quickly pervading the whole system, more especially affects the integuments of the head, which are wounded. Hence, it follows, that the wound first acts on the primæ viæ, and afterwards these re-act upon it.

Sometimes, however, the bilious character is less prominent in this species of erysipelas. In this circumstance, the symptoms are not preceded by nausea, bitterness in the mouth, &c.; but the tongue is dry, and even reddish; the thirst is extreme; the pulse stronger and less contracted; the swelling is considerable, yet the skin is more red and tender, than in the preceding case; the pain is acute and throbbing; the face is red, and the eyes inflamed; with which symptoms are frequently associated delirium, coma, &c. In a short time, such symptoms usually decline, especially, if bleeding has been properly adopted. Then the tongue becomes furred, nausea and vomiting succeed, and the bilious form of the complaint ensues.

The erysipelas of the scalp, attendant on wounds, has been erroneously imputed by several writers to an injury of the aponeurosis of the occipito-frontalis muscle, and pericranium, and extensive incisions, down to the skull, have been advised, for the purpose of removing the supposed tension of that tendinous expansion. I will not say, that there never is a case, that can be benefited by such operation; but I will assert, with Bichat and Desault, that it has been too extensively recommended, the affection being in most cases external to the fascia in question.

There are two main indications in the treatment; one is to attack the disease at the fountain head; the other is to combat the local effects. The first is fulfilled by administering evacuants, so as to empty the stomach and bowels, and remove that deranged state of the viscera, which excites and influences the local effects on the wound. With this view, Desault, on the very first approach of the gastric complaints, used to give the patient a grain of antimonium tartarizatum dissolved in plenty of water, which dose was repeated as often as was necessary for the relief of the bilious symptoms. The diet, for the first few days, was very low, but, afterwards, improved, as the symptoms yielded. Diluents were also given. To the wound, a poultice, containing resolvent ingredients, was applied, care being taken not to lay it far beyond the edges of the injury. In the bilious form of the complaint, Desault was adverse to bleeding, and he warns us, not to let the patient too soon expose himself to the air, after getting well, as fatal relapses have been thus caused.

In the phlegmonous form of the complaint, already adverted to, Desault approved of repeated bleeding.*

In this country, when the erysipelas proceeds from a mere contusion, and there is a chance of avoiding suppuration, surgeons very commonly apply the saturnine lotion to the head, practise bleeding, and exhibit purgative and saline medicines. I think antimonials are much less used, than they ought to be. When a wound exists, a small poultice should be applied, till the injury puts on a clean granulating appearance.

FRACTURES OF THE CRANIUM.

When the breach of continuity in the bone is very fine, it is termed a *fissure*; when wide and open, it is named a *fracture*. When the fracture happens in a situation, at some distance from the spot, on which the external violence immediately operated, it is denominated a *counter-fissure*. The skull, at the fractured part, either continues on a level with the rest of the cranium, or it is depressed. The inner table alone is sometimes broken, while the external one remains entire.

Counter fissures are never depressed, nor attended with splinters and fragments of bone. They can only happen, when the head is struck by a broad flat body, in which case, the force, tending to produce the breach of continuity, is transmitted to all the bones of the skull, and if the part that is directly struck, can make a resistance equal to ten, while another part can only make one equal to five, the latter is fractured, and not the former. But, as the weapons and bodies, with which blows are given, mostly have angles and prominences, we must see the reason, why the cranium is generally fractured immediately where the violence is received.

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* See Œuvres Chirurgicales de Desault, par Bichat, tom. 2, sect. 1, art. 1.

Fractures of the cranium, abstractedly considered, are quite destitute of danger and evil consequences. This is consistent with reason and experience. Fractures of the cranium have often been known to get well, without the occurrence of any bad symptoms whatever. The alarming symptoms, which sometimes originate when the skull is broken, are occasioned by the bone being beaten inward, so as to press upon or even wound the brain; or by the sharp irregular edges of the fracture irritating the dura mater, and making it inflame and suppurate; or else by mischief done to the parts within the cranium by the same force, which broke the bone itself.

A fracture of the cranium, without depression, is not only itself unproductive of any alarming effects, it is also unattended with any particular symptoms. Its existence can only be ascertained by the eye, or the touch; and therefore its diagnosis is only easy when it is exposed in consequence of a wound. However, a surgeon need not be solicitous to find out an undepressed fracture; nor is he warranted in making an useless incision merely to see the crack; for, if symptoms demand the application of the trephine, he is to apply it to the bone, whether it is fractured or not; and, if they do not require the operation, the fracture itself can never be a reason for the practice.

Bleedings from the nose, mouth, and ears, are no signs of a fracture of the cranium. The only inference from them is, that the force applied to the head has been violent. But, even this inference is not a certain one; for some persons have hemorrhages of this sort from very slight causes. Vertigo, paralysis, vomiting, loss of sense, &c. so often attending these cases, denote injury of the brain, and not a fracture of the skull.

Though a mere breach in the skull itself is not a source of danger, yet, considered as a symptom, it is of the highest importance. It shews, in the majority of cases, that very considerable violence has been applied; and, consequently, it excites a well-founded apprehension, that the parts beneath have, at the same time, been injured. Such concomitant injuries are not the effects of the fracture; but, the direct effects of the same force, which produced the breach of continuity in the bone. The surgeon, who considers these injuries as consequences of the fracture, directs his whole attention to the latter, searches for the causes of the bad symptoms beneath it alone, and often is unable to find them there.

Although the internal mischief is mostly situated beneath the place, where the external violence has operated with most force, that is, beneath the fracture, yet it not unfrequently lies in a remote part. The same violence, which breaks the cranium, may occasion a concussion of the brain, an extravasation of blood beneath the skull, and a subsequent inflammation of the brain and its membranes.

Fractures, with considerable depression of the bone, are sometimes unattended with alarming symptoms; and, in this circumstance, the application of the trephine is unnecessary. We shall see, from what follows, that there can only be one genuine reason for trephining, viz. to remove such pressure from the surface of the brain, as gives rise to *existing* bad symptoms.

The only treatment, which a fracture of the skull necessarily requires, consists in taking measures to guard against the inflammation of the brain; a consequence, which is sometimes caused by the mechanical irritation of the fracture, but, in most instances, by the same violence which broke the bone itself. If we could ascertain, that the inequalities, or pressure of the fracture caused the bad symptoms, we should be warranted in removing the fractured part with a trephine; but all we can rationally do in common cases, is to bleed the patient freely and repeatedly from the temporal artery and the arm, and prescribe antimonials, saline purgative medicines, and a low diet. The antiphlogistic regimen should be continued at least a month; for it is by no means uncommon for inflammation of the brain to follow injuries of the head, a very considerable time after the patients have had reason to suppose themselves in perfect safety.

PRESSURE ON THE BRAIN FROM EXTRAVASATION.

External violence, applied to the head, very frequently occasions a rupture of the spinous, or some other, artery of the dura mater; and a large quantity of blood becomes effused on the surface of this membrane beneath the cranium. In many instances, the blood is extravasated between the dura and pia mater, or in the very substance or cavities of the brain. Extravasations, between the dura mater and any part of the base of the skull, are mostly fatal.[*] When the blood lies between the dura mater, and tunica arachnoides, it is generally scattered about, and according to Desault, can produce but little pressure on the brain, unless the quantity is considerable. If the extravasation happens in the convolutions of the brain, the blood is also widely diffused; but when it is poured out in the ventricles, or substance of the brain, it is always circumscribed.[†]

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[*] Œuvres de Desault par Bichat, tom. 2, p. 24.

[†] Op. cit. p. 26.

The symptoms of pressure on the brain, whether that pressure be caused by a depressed portion of bone, by blood, or matter, are all of one kind.

In cases of extravasation of blood, the patient has usually been stunned by a blow, from which state, he sometimes recovers very soon afterwards, and in other instances remains senseless. When he regains his senses soon after the first effects of the violence have subsided, and afterwards gradually relapses into a drowsy condition, and then into a state, which I am about to describe, considerable light is put upon the case by there having been an interval of sense. That the following symptoms cannot arise from the concussion is proved by the patient having recovered his senses, which he at first lost by being stunned; that the symptoms cannot be imputed to a depression of any part of the skull is clear, because the patient would have continued senseless from the first; that the same symptoms cannot be attributed to matter beneath the skull is certain; because the time would not have been sufficient for the formation of matter, and there have been no symptoms of inflammation of the dura mater. Here any reflecting man must know, that hemorrhage beneath the skull must exist, and as it increased after the accident, that it alone must occasion the perilous symptoms.

Unfortunately, much obscurity is frequently occasioned by the effects of extravasation taking place, before those of concussion have subsided, in which cases, not the least interval of sense returns, and we know not whether to ascribe the general insensibility to the former, or the latter cause. But the worst cases of all are those, in which concussion and extravasation are coexistent.

When the quantity of blood is at first small, drowsiness and headach may be the only symptoms. When, however, the pressure on the brain is augmented by the increased extravasation, the patient is gradually deprived of all sensibility, as in apoplexy. The eyes are half open; the pupil dilated; the iris immoveable, even when a candle is brought near the eye; there is no sickness which betrays sensibility in the stomach and œsophagus; the pulse beats regularly and slowly; the feces and urine pass involuntarily; and respiration is carried on with difficulty, and with a stertorous noise.

These symptoms indicate with tolerable certainty the existence both of extravasation, and dangerous pressure on the brain; but it is to be lamented, that the surgeon has few or no means of judging with precision, where the effused blood is situated, nor of course where he should perforate the cranium with the trephine. He neither knows whether the blood lies immediately under the skull, between the dura mater and tunica arachnoides; in the convolutions; in the ventricles; or deeply in the substance of the brain. Supposing it to lie upon the dura mater, he knows not exactly at what part.

The common rule in these cases, is to apply the trephine to the place where there are any traces of external violence, as the extravasation is very often situated under that part of the skull which received the blow. Should an appearance of contusion be manifest on the scalp, after the head has been shaved, and carefully examined; should the scalp be wounded; or lastly, should there be a visible fracture of the cranium; the perforation is to be made in the situation of such injuries. The practitioner, however, has often the mortification to find, that, in following this plan, the extravasation, being elsewhere situated, is not brought into view. When the dura mater appears particularly prominent through the opening, as if blood were under it, some surgeons have advised a puncture to be cautiously made in it. This practice might indeed sometimes give vent to a small quantity of serum; but the blood, when in this situation, being always widely diffused, an effectual discharge of it can hardly be expected. I need scarcely state the absolute impossibility of giving vent to an extravasation more deeply situated. Even when there are no external appearances to determine the place, on which the trephine should be applied, and the above urgent symptoms prevail, it may still be proper to perform the operation. Perhaps, in the midst of such obscurity and danger, it might be justifiable to make a small perforation in the course of one spinous artery of the dura mater; if this should not detect the seat of the extravasation, another perforation might be made on the opposite side of the head.*

Most surgical writers, indeed, caution us not to apply the trephine to the anterior inferior angle of the parietal bone, on account of the trunk of the spinous artery running in a furrow, and even sometimes in a bony canal, in this situation, so that it would be injured. However, this advice seems to me very questionable; for extravasated blood is more frequently found on the dura mater, over the course of the above vessel, than any where else; and were the artery wounded in trephining, how easily a little plug of lint, introduced into its orifice, would stop the hemorrhage?

Paralysis is a symptom of pressure on the brain, and when it seems to affect one side of the body more than the other; when one pupil seems more dilated than its fellow; we have great reason to suspect, that the extravasation is on that side, on which there is least paralysis, and least dilatation of the pupil. In the Hôtel Dieu, however, the extravasation has frequently been found on both sides of the head, or generally diffused, even though the paralytic affection was local.*

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* Would a surgeon feel most vexed at not finding the blood under the place, where he trephines; or at finding it, on examination after death, in a situation, from which it might have been discharged by the operation?

Mr. Abernethy has observed, that when blood lies on the dura mater, the bone above it does not bleed when scraped.† This is a most valuable remark, if the criterion be found to agree with general experience.

I should be sorry to appear too sanguine an advocate for trephining, while I believe the operation itself may sometimes be a source of dangerous and fatal consequences.

The experienced Desault, during the last five years of his practice at the Hotel Dieu, renounced the operation altogether in fractures of the skull, and he appears to condemn it in extravasations. His reasons for this determination are strong; he placed no dependance on the symptoms, usually mentioned by writers, as denoting extravasation, such as drowsiness, loss of sense, vertigo, stupefaction, and delirium. He believed, that these symptoms might also arise from concussion, or inflammation of the brain. Paralysis of the side of the body, opposite that of the extravasation, as I have said, possessed not his confidence. He conceived, that paralysis might depend on concussion, or inflammation. Convulsions of the affected side, as represented by some writers, did not appear to Desault to be invariably attendant on extravasation, or not sometimes to arise from other affections of the brain. To convulsions, and paralysis, he imputed the spasmodic vomiting, the involuntary discharge of feces and urine, the dilatation, immobility, or contracted state of the pupil, &c. and consequently all these effects, according to Desault, may depend on a variety of causes, and cannot be characteristic of any particular one. His conclusion is, that there are no symptoms indicating with absolute certainty the existence of extravasation.

Admitting that extravasation can be ascertained by symptoms, Desault argues, that they afford us no information respecting the situation of the effused blood, and consequently, they are but an insufficient indication for trephining. He contends, that the detection of a fracture does little towards the discovery of the seat of the extravasated blood. Fractures often exist without extravasation, and extravasations frequently occur without fracture, or if they exist together, they may be very distant from one another. Desault found the two latter cases the most frequent of all. It is maintained, that in most instances in which the trephine has been applied to the fractured part, effused blood has not been found underneath the bone. Even when blood appears to issue from the fissure, may it not proceed from the diploe?

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* Œuvres de Desault par Bichat, tom. 2, p. 27.

† Surgical Works, vol. 2, p. 47.

In the enumeration of the reasons for renouncing the trephine in these cases, the possibility of extravasation existing, without any dangerous symptoms, is noticed. Desault states, that this may happen when the blood is scattered between the membranes of the brain, or is shed very slowly, and lies diffused on the dura mater. Here, however, I may remark, that no surgeon would trephine, because the symptoms are the only true reason for the operation; nor, without them, would the extravasation be even suspected. With regard to the uncertainty of the diagnosis, I believe, Desault was incorrect in denying the possibility of distinguishing the difference between the symptoms of extravasation, and those of concussion, phrenitis, &c. Such discrimination has certainly been made, with considerable success, by Mr. Abernethy;* and the symptoms characteristic of these several cases, as related by myself in this publication, will be found unlikely to be confounded. It is principally in mixed cases, as when a man is labouring under the effects of concussion and compression together, and perhaps inflammation, that obscurity and uncertainty will be experienced.

PRESSURE ON THE BRAIN FROM MATTER.

When a considerable collection of matter forms on the surface of the dura mater, it finally produces the same sort of symptoms as have been just described. But previously to their occurrence, the patient must have betrayed signs of an inflamed dura mater, while in the situation, immediately over the collection of matter beneath the cranium, the symptoms of pressure from this cause must have been preceded by a puffy, circumscribed, indolent tumor of the scalp, and a spontaneous separation of the pericranium from the skull under such tumor. If a wound be situated immediately over the part of the cranium covering the suppuration of the dura mater, the edges lose their vermilion hue, and become pale and flabby; instead of healthy pus, a thin gleet is discharged, and the pericranium is loosened from the skull, for some extent from the edges of the sore.

This case demands the immediate application of the trephine, in order to give vent to the matter beneath the bone. The antiphlogistic treatment is also rigorously indicated, low regimen, copious bleedings, saline purgatives, antimonials, &c.

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* Surgical Works, vol. 2.

CONCUSSION.

The first effect of concussion consists essentially in a sort of contusion, or general irritation of the brain, occasioned by the shock, which every part of this organ has received. The nature of such shock is readily conceived, when we recollect the way in which contusing bodies act upon the cranium. When the skull is struck, it changes its shape; it becomes flattened in the direction of the violence, and widened in the opposite direction, as happens in the same circumstance to every round elastic body. Hence, the brain suffers an universal shaking and compression, and being contused and irritated, an increased determination of blood to it has then a tendency to take place. The truth of this doctrine is proved by experience, which teaches us; first, that in the majority of cases, inflammation of the brain succeeds concussion; secondly, that the best method of preventing this secondary effect is to excite an artificial irritation, which counteracts the effects of that, to which the brain has been subjected.*

Whatever may be the nature of concussion, certain it is that it may happen in very different degrees. How many varieties exist between that slight stunning, the sudden effect of an inconsiderable blow, and that complete disorganization, which, at the instant of the injury, annihilates at once all power of motion and every spark of life!

When the concussion has not been great, a transient stunning, a slight pain in the head, a little acceleration of the pulse, a vertigo and sickness, sometimes immediately follow such accident; but none of these complaints last long, especially if evacuation has been used.† In certain instances, however, the dura mater inflames after slight blows on the head, and this at a period when sometimes there is not the least apprehension of danger. If the violence has been great, the symptoms are as follow: the patient is at first stunned and in a state of total insensibility; his extremities are frequently cold, his pulse weak, slow, and intermitting; his respiration hardly perceptible; his power of motion abolished; in short, he is in a state, which is the immediate result of the violent commotion, which the brain has suffered. This is what Mr. Abernethy has so judiciously called the first stage of concussion. In proportion as the stupefaction, arising directly from the injury, goes off (supposing the violence not to exceed a certain degree, for then no signs of returning sensation follow) sickness, increase of the pulse and respiration, more or less motion, and other symptoms take place, which are followed by marks of inflammation of the brain. The tendency to phrenitis gradually increases as the first effects of concussion subside. If the patient's eyelids are now opened, he will shut them again in a peevish manner; the pupil is contracted, and though the patient is regardless of slight impressions, he is not by any means insensible. As the case advances, the patient gets no sleep at all; has a wild look, an eye much like that of a person who has long watched through apprehension and anxiety; talks much and very inconsistently; has a hard labouring pulse; if not retained, he will get out of bed, and act with a kind of frantic absurdity; and, in general, he appears much hurt by a strong light. As the signs of delirium increase, the pulse becomes small, frequent, and even rapid. The inflammation under the skull may now produce suppuration, or a copious effusion of serum, and to the foregoing afflictions may be added those depending on the pressure of the secreted fluid. Stertorous respiration is said more particularly to indicate compression than concussion.

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* Œuvres de Desault par Bichat, tom. 2, p. 57, 58.

† Pott's Chirurg. Works, by Earle, vol. 1, p. 40, edit. 1808.

Death is the unavoidable consequence of violent concussion; such is then the extent of the disorder, that every means is incapable of re-establishing the functions of the brain. But when the injury, which this organ has received, is less considerable, its functions may be gradually restored in a more or less perfect state. Frequently the patient is for ever afterwards affected by the accident. Imbecility, loss of memory, and a marked change in the character are sometimes the permanent consequences. In certain instances, the patient's memory remains weakened, and he can only recollect things, which have very recently attracted his attention. Desault used to cite a curious case, in which the patient could at first only remember circumstances with which the mind had been lately impressed; but afterwards, he could recollect nothing, except what had happened in his childhood.* In the work referred to below, mention is also made of a lunatic, who was so fortunate as to recover his reason, in consequence of an accidental concussion of the brain.† Occurrences of the latter kind, however, are uncommon; but the same cannot be said of the confusion in the ideas, memory, &c.

That there exists a most intimate sympathy between the brain and liver, cannot be doubted, how inexplicable soever the fact may be. It is on this account, that concussion of the first viscus is so apt to produce a change in the functions of the second; a change demonstrable in the dead body by the appearances of inflammation, and abscess; and, in the living, by the nausea, bilious vomitings, and disordered state of the alimentary canal. This last kind of sickness is quite distinct from that, which immediately follows the accident. That the affection of the liver is not owing to the general shock, which the body has suffered, seems proved by the circumstance of that organ alone always suffering, while other viscera remain uninjured. According to Desault, an abscess of the liver is generally a fatal complication of concussion, and, therefore, we are particularly enjoined to try to prevent it by the mode of treatment.

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* Œuvres de Desault par Bichat, tom. 2, p. 59. † p. 61.

Nothing can be more opposite, than the methods of treating concussion of the brain, advised by different writers, and taught in different schools.

The treatment, of which I entertain the highest opinion, consists in taking away very copious quantities of blood repeatedly from the temporal artery and arm, giving antimonials, administering saline purges, and aperient clysters, and ordering a low diet. In the first stage of concussion, when all the animal functions are, as it were, at the lowest ebb, such measures every body will allow are not necessary.* While the system is in this state, cordials and stimulants may be allowable, but when the second stage arrives, which is invariably attended with a tendency to inflammation of the brain, or its membranes, the antiphlogistic treatment holds forth the best chance of preservation. Counter-irritation should also be excited on the outside of the head by a large blister, which may afterwards be kept open with the savine cerate.

It is wonderful, what immense quantities of blood it is necessary to take away in these cases, in order to keep down the symptoms of phrenitis.

The primary effect of concussion being to produce an irritation of the brain, whence originate afterwards inflammation of this organ, and frequently an affection of the biliary viscera, Desault thinks, that the essential indications are to endeavour to prevent these latter consequences, and at the same time revive the vital powers.

With respect to bleeding, this eminent surgeon believes, that its utility has been too much exaggerated. In concussion, he observes, there is almost always a general debility, which depends on the injury of the nervous system, and is indicated by the state of the pulse, breathing, &c. Besides such weakness, says he, the affection of the primæ viæ is generally a counter-indication to bleeding. However, Desault allows blood to be taken away once, when the viscera do not seem particularly affected, and the pulse is soft and full, the countenance flushed, the eyes lively, &c. By a single evacuation, says he, the pulse is often rendered feeble, the face becomes pale, debility is induced, and the primæ viæ are thrown into a disordered state. He cautions us against a repetition of bleeding in this kind of case. In an opposite one, he allows the evacuation to be made once more; but he himself never bled a third time.*

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* Mr. Hey, among others, thinks copious bleeding injurious "during the diminished state of the vis vitæ, which immediately succeeds the injury." He has seen great benefit arise from the warm semicupium, and blistering the head after topical bleeding. Pract. Obs. in Surg. p. 486, edit. 2.

As for stimulants, Desault thinks, that in concussion they are highly advantageous. 1. They cause an artificial irritation in a different part from the brain, and thus tend to counteract the inflammation that arises from the irritation of this organ itself. 2. They act on the nervous system, and remove the torpor, into which it has been thrown. He considers the scalp as the best place for their application, either from its proximity to the brain, or the sympathy between the latter viscus and the skin of the head. He is an advocate for the most active stimulants, the main object being to excite a violent irritation. Hence, the emplastrum lyttæ, and a strong volatile liniment, were the substances he employed in his own practice. He used to apply them to the whole scalp, and keep up the irritation by not allowing the excoriated surface to heal. In this country, we should dress the blistered part with the savine cerate.

Others have not been content with external stimulants; but, have had recourse to the internal exhibition of opium, brandy, wine, aqua ammoniæ puræ, æther, and the most powerful cordials.

I have to observe, however, that though Desault had extensively adopted the blistering plan, he renounced it at last, in favour of the method of procuring evacuations by the antimonium tartarizatum. He thought, that this medicine in particular, did good by producing an irritation in a different part from the brain, exciting the whole nervous system, creating a salutary perspiration, and promoting the bilious secretion, so as to counteract inflammation and suppuration of the liver, that consequence, of which Bertrandi, Pouteau, Desault, and others, have entertained the most serious apprehension. Desault commonly prescribed at first a grain of the antimonium tart. in solution; but, he found it necessary to vary the dose considerably in different cases, one grain having as much effect in slight concussions, as four in violent ones, where the sensibility of the viscera was much lessened. The medicine does not always act as an emetic; sometimes it operates by stool. In this circumstance, it does equal good. It irritates the alimentary canal, and, in proportion as the fluids are determined thither, they flow in less quantity to the brain. The remedy is not to be discontinued on the first subsidence of the symptoms. The irritation of the brain is permanent; so should that of the stomach and bowels be. The medicine, therefore, ought to be continued uninterruptedly for six, eight, ten, or twelve days. Here, the object is not simply to produce evacuations; but, also to keep up an irritation. It was for this reason, that Desault conjoined with the antimonial solution the use of purgative stimulating glysters. In ordinary cases, he used to cover the head with a large emollient poultice, which, by maintaining the scalp moist and warm, he thought, might have the effect of determining the fluids to it from the brain. When the antimonium tartar. failed to produce relief; he was in the habit of trying what benefit could be derived from giving this medicine and blistering the scalp together.*

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* Op. cit. p. 64.

In taking leave of this subject, I must express my suspicions, that the affection of the liver and primæ viæ has been exaggerated by the French surgeons, since English surgeons in their dissections do not seem to find the liver frequently inflamed and suppurated in patients who have died of concussion; nor, do they observe in practice so much of the bilious vomiting and tension of the hypochondria, as Desault would lead us to expect. It seems to me, that, the best way is, with Mr. Abernethy, to divide concussion into two stages. In the first, the system is senseless, and almost lifeless. Here, bleeding and evacuations are not essential, while stimulants and cordials may do no harm, and may perhaps do good by promoting the return of sensation, the action of the heart and arteries, the function of respiration, &c. But, in the second stage, when the first effects of concussion have subsided, and the disposition to phrenitis is about to commence, I think reason and experience are decidedly in favour of copious and repeated bleeding, evacuations, low regimen, and blistering the head. But, with this treatment, I see every reason to combine Desault's method of exhibiting the antimonium tart. in solution.

Schmucker, the eminent Prussian surgeon, derived from vast experience, in actual military service, excellent opportunities of witnessing a variety of injuries of the head from gunshot wounds.

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* Œuvres de Desault par Bichat, tom. 2, p. 66—69.

His observations are highly in favour of applying cold washes to the head, for the relief of concussion of the brain. His lotion is thus composed: to five gallons of cold water, are added a pint of vinegar, a pound of nitre, and eight ounces of sal ammoniac. This mixture is kept for use in a cold place. In conjunction with this application, he recommends repeated bleeding, and stimulating clysters. When, under such treatment, the patient still continues senseless, Schmucker applies sixteen leeches, or more, to the neck, temples, or behind the ears.*

PHRENITIS.

Inflammation of the brain is a frequent consequence of injuries of the head. There is an increased and disordered state of the sensibility of the whole nervous system; the retina cannot bear the usual stimulus of light; the pupils are contracted; the pulse is frequent and small; the eyes are red and turgid, perhaps, in consequence of the ophthalmic artery arising from the internal carotid; the countenance is flushed, and the patient is restless, mutters incoherently, and grows wild and delirious. In a more advanced stage, he is affected with coma, insensibility, and convulsions.

Desault divides phrenitis, from injuries of the head, into two kinds, the phlegmonous and bilious. The first is described as being attended with hardness, frequency, and strength of the pulse; slow full respirations; broken sleep; redness of the tongue; animation of the countenance; excessive sensibility of the retina to the impression of the light; a full and wild appearance of the eyes; an acute throbbing pain in the head; general heat of the body; absence of all marks of gastric disorder; and, after a time, vertigo, loss of sense, delirium, coma, and convulsions.

In the bilious phrenitis, on the contrary, Desault represents the pulse as being contracted, frequent, and small; the fever characterized by a dull pain in the head, dryness and burning heat of the skin; yellowness of the face and eyes; bitterness in the mouth; nausea; bilious vomitings; clammy furred tongue; heaviness, pain, and tension in the region of the liver; deep yellow stools; frothy, greasy, saffron-coloured urine; a variety of gastric complaints; and (as in the preceding case) delirium, loss of sense, &c. though in a less remarkable degree.

Desault states, that, age, climate, temperament, constitution, and season of the year, &c. have the chief influence in determining the kind of inflammation. When the patient is young, robust, and vigorous; when he is residing in a fresh pure air; when he is naturally of a full inflammatory habit; when the accident has occurred in the spring; the brain is usually affected with phlegmonous inflammation. On the contrary, when the patient is of middle age and of a bilious constitution; when the season for gastric indisposition prevails; and when the place of residence is damp, and unhealthy; the inflammation is apt to be of the erysipelatous kind. But, besides these general causes, Desault observes, there is a particular one, deserving great attention, with regard to the second species of inflammation. We have seen, that the effects of concussion are alledged to produce disorder of the biliary organs, and primæ viæ. Now these latter, it is said, may re-act upon the brain, just as the concussion of this viscus operated upon them.

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* See Chirurgische Wahrnehmungen, von J. L. Schmucker. Erster Theil, p. 154—158.

In general, the causes of inflammation of the brain, after injuries of the head, continue to have, for a long while, a tendency to operate. Hence, considerable danger, and the necessity of paying much attention to the patient.

It appears to me, that, we seldom observe in London, the erysipelatous bilious cases, described by Desault. Nor, in inflammation of the brain, do we find the pulse strong, as this surgeon states it to be in phlegmonous cases, except, indeed, the patient is remarkably sanguineous, the disease incipient, and confined principally to the dura mater. On the contrary, the pulse is almost always small and frequent.

Ordinary cases of inflammation of the brain, and its membranes, require bleeding, which is to be more or less frequently repeated, according as the patient's strength will allow. There is an advantage in taking blood from the temporal artery; or, in conjunction with venesection, blood may be drawn from the temples by leeches, or cupping glasses. The skin ought to be kept moist with antimonials. Counter irritation should be excited on the scalp with blisters. Laxative glysters, and saline purgatives should be administered. Acidulated beverages ought to be given, and, lastly, the diet should be very low.

In the bilious, or erysipelatous form of the complaint, Desault chiefly trusts to the efficacy of procuring evacuations, by exhibiting the solution of antimonium tartarizatum, in repeated doses, for a week, ten days, or even a fortnight. The fear of a relapse led him to discontinue the medicine by degrees, giving it after a time every second, and then every third day. He condemns bleeding; but, enjoins the use of diluent, acid drinks; laxative glysters; and an emollient poultice to the head, with a view of keeping the scalp warm and moist, so as to promote the determination of blood to it, and thereby lessen the quantity of this fluid in the vessels within the cranium.*

OPERATION OF TREPHINING.

This operation consists in removing a portion of the skull, and is usually done for the sake of elevating a part of the bone producing dangerous pressure on the brain, or in order to give vent to collections of matter, or blood, which have the same effect.

Every part of the cranium cannot be trephined with equal safety. The moderns have discovered, however, that the mere presence of a suture ought not to deter the surgeon from making the perforation in any place, which seems advantageous. I believe, that the fears, respecting wounds of the longitudinal sinus, have been vastly exaggerated, and that if the situation of a depressed fracture, or extravasation, demanded the removal of a piece of the skull directly over the vessel, the operation would be justifiable.

The longitudinal sinus has often been wounded by spiculæ of the cranium, in cases of fractures; and it has been purposely punctured with a lancet, in order to bleed the patient; yet, the hemorrhage was never known to be troublesome, after placing a little bit of lint over the opening.†

But, though I feel warranted in making this statement, concerning the longitudinal sinus, I am not acquainted with any facts, shewing that hemorrhage from the lateral sinuses would not be likely to prove more serious. These latter, are much larger, and the deep transverse furrows, in the middle of the inner surface of the os occipitis, are occupied by them.

Authors generally interdict the application of the trephine to the anterior inferior angle of the parietal bone, on account of the trunk of the spinous artery of the dura mater being situated in a groove on the inner surface of that part of the skull. For my own part, I should never be afraid of trephining here; for, if the above vessel were wounded, a little dossil of lint, introduced into the opening, would immediately stop the bleeding.

It is a maxim to avoid trephining any part, from which a complete circle of bone cannot be sawn, without hurting the dura mater. The inequalities of the inner table of the skull, are, in several places, such as to make attention to this rule necessary. Thus, the centre of the forehead is rather an inconvenient part for the trephine, because, when the spine of the os frontis is prominent, it could not be sawn, without the dura mater being wounded by the teeth of the saw. Should the surgeon apply the trephine to this place, he must be careful not to saw too deeply; but, prefer separating the circle of bone with the elevator, to making any dangerous attempt to cut completely through the projecting spine.

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* Œuvres de Desault par Bichat, tom. 2, p. 69—81.

† Cases in Surgery by J. Warner, p. 8, edit. 4; Marchetti, Obs. 4. Sharp's Operat. p. 144. edit. 3; Pott's Chirurg. Works, vol. 1, p. 156—159, edit. by Earle, 1808.

Surgical writers caution us not to trephine over the frontal sinuses, and, not without reason; for, if we carry on the perforation in the direction, in which we begin it, we shall certainly cut the inner table entirely through, on one side of the circle, before the other is at all divided. Yet, the frontal sinuses are not insuperable obstacles to the operation, if the outer table be first removed with a large trephine, and the inner table be then perforated with a smaller one, placed evenly and perpendicularly on the posterior surface of the sinus, as suggested by Mr. C. Bell.*

You cannot safely apply the trephine lower down on the fore part of the head, than half an inch above the superciliary ridge of the os frontis, without risk of injuring the orbit. If requisite, the trephine may be applied to the squamous portion of the temporal bone; for, wounds of the temporal muscles are now not so much dreaded as they were by our prejudiced ancestors. The unevenness of the os occipitis; the course of the longitudinal and lateral sinuses; and the way, in which a part of this bone is covered by muscles; have made surgeons fearful of applying the trephine to it. However, there are two small spaces on each side of the groove for the longitudinal sinus, where a trephine may be safely applied.† The operation may even be done below the transverse ridge, near the foramen magnum, the muscles attached to that part of the bone being no valid objection, notwithstanding the assertion of writers,‡ as a division of them is not dangerous, while the unrelieved pressure on the cerebellum, would almost certainly be fatal.§

When the bone is already sufficiently exposed by a wound, the operation may commence at once; but otherwise, it is first requisite to make room for the application of the trephine, by making an incision of a crucial form, or shaped like the letters

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* Operative Surgery, vol. 1, p. 439.

† See a case mentioned by Warner, p. 18, edit. 4.

‡ Bertrandi, Traité des Operations, p. 267, Paris edit, 1784.

§ See a Case illustrating the propriety of such practice, in Medico-Chirurg. Trans. vol 2, p. 104.

T or V. None of the scalp should ever be removed, as it is quite unnecessary, and might afterwards occasion serious deformity.

The incision should be made down to the bone at once; but, in cases of large fractures, attended with great separation of the broken edges, or with loose pieces, the danger of pressing too hard with the scalping knife is obvious.

Mr. Pott informs us, that a suture, or the impression of a vessel on the surface of the bone, may be discriminated from a fracture or fissure, by the undetached state of the pericranium. This membrane is always found loose and detached from the track of a fracture; besides which, the edges of a fracture constantly seem rough to the probe, or finger. The natural situation of the sutures is also a source of information to a surgeon, who is not deficient in anatomical knowledge.

It would be dangerous to apply the crown of the trephine on depressed portions of the skull. The perforation is always to be made on that side of the fracture, at which the elevator may be most conveniently introduced beneath the depressed bone for the purpose of raising it, attention being paid to the anatomical objections to trephining in a few particular situations. In cases of extravasation, the perforation ought to be made at the place, where there are traces of violence done to the scalp; for, in most instances, the blood will be found beneath this situation.

When the scalp has been divided, and loose splinters of the cranium are found lying underneath, they ought to be taken away with the forceps or finger; they can only be regarded as extraneous bodies, and their own continuance may be productive of considerable irritation. The depressed pieces of the skull, causing the bad symptoms, are sometimes completely detached from the rest of the cranium, and may be taken away in the same manner.

In every instance of fracture with depression, unattended with any motives for supposing, that part of the pressure on the brain arises from extravasation, provided such depressed fracture can be raised with a pair of forceps, or an elevator, without applying the trephine, the latter operation may be dispensed with.

It is customary to scrape the pericranium from the part of the bone, on which the crown of the trephine is to be placed.

In order to fix the centre-pin of the trephine, surgeons make a small hole in the external table of the skull with an instrument named a perforator. The crown of the trephine is to be alternately turned in one direction, and then in the other by the pronation and supination of the surgeon's hand. As soon as the teeth of the instrument have made a circular groove, sufficiently deep for fixing the trephine, the centre-pin is to be removed, lest it should injure the dura mater, before the internal table of the cranium is perforated. At first, the operation may proceed with briskness, as the surgeon cannot possibly do mischief; and, every now and then, the trephine is to be taken out of the circular groove, that the bone-dust may be brushed from the teeth of the instrument.

When the sawing is more advanced, the surgeon must proceed with greater caution, and frequently examine with the point of a quill, whether any part of the circle is nearly, or completely sawn through. When this is the case, the pressure of the instrument is to be inclined to the parts, which are not sufficiently perforated. It is always better to use a little force in raising the circle of bone with the elevator, than to run any risk of injuring the dura mater and brain, by sawing too deeply.

In some few cases, the surgeon clearly perceives when the saw has penetrated the diploe, by the sensation which the instrument communicates to his fingers, in consequence of entering a soft substance, immediately after having divided the hard texture of the outer table, and by the blood which then appears in the circular groove, and on the teeth of the saw. The operator, however, is not warranted in sawing too boldly, until a criterion of this sort takes place; for, in many skulls, and in different parts of the same skull, the diploe is very thin, and, in old persons, it is sometimes quite obliterated.

When the surgeon knows with certainty, that he has arrived at the diploe, the rest of the sawing should be accomplished with slowness and circumspection. After having removed the circle of bone, if the lower edges of the perforation next the dura mater are splintered, they may be made smooth by means of an instrument, called a lenticular.

When the whole track of the depression cannot be raised, or the whole quantity of blood or matter cannot be evacuated by making one perforation, the trephine must be applied again; and indeed as often as the circumstances of each particular case demand. Sawing out large portions of the skull, is a measure itself not exempt from the risk of bad and even fatal consequences; but it is certainly less dangerous than not completely effecting the object of the operation, viz. the removal of the pressure from the surface of the brain. The pain of the operation is here no objection; for the majority of patients, on whom it ought to be practised, are almost destitute of sensation.

When the operation is finished, the scalp is to be laid down in its natural position, and dressed very lightly with a pledget of any simple unirritating ointment.

The importance of preserving every part of the cranium, which the safety of the patient does not compel us to remove, is a truth with which I am forcibly impressed. Nor can it be disputed, that the trephine is often, as the experienced Mr. Hey has explained, an objectionable instrument, since the piece of bone sawn out must always be of one figure, whatever be the form of the fracture, and the quantity of bone removed must frequently be greater than the case requires.* Hence this judicious practitioner very seldom uses the trephine, or trepan, but saws resembling those delineated in the annexed plate.† With the convex one you can saw in a curvilineal direction. There are certainly numerous cases, in which it is unnecessary to remove a whole circle of the cranium for the purpose of raising a depression; for instance, if the fracture were shaped like the letter V, and beaten inward, by making a division across its base, the depressed portion might easily be taken away. Mr. Hey's saws are also highly useful in cases of diseased bones; for no instrument is so well calculated for the removal of large portions of dead bone, which are wedged in the substance of that which is living.

CHAP. II.

OF ENCEPHALOCELE; FUNGUS, OR HERNIA CEREBRI.

WHEN a portion of the brain, together with its membranes, protrudes through a preternatural opening in the cranium, the disease receives the above appellations. There appear to be several varieties of this affection.

One case sometimes occurs in young children before the ossification of the cranium is completed, and then the tumor is covered by the common integuments of the head. In one example of this kind, the falciform process of the dura mater was found contained in the swelling.‡

This species of encephalocele usually appears as a soft, smooth, round tumor, which has a pulsation corresponding to that of the arteries, which yields and disappears under compression which is unattended with any change in the colour of the skin, which is formed in the situation of the fontanellæ and sutures,

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* Practical Observations in Surgery, p. 7, edit. 2. † Plate 3.

‡ Corvinus de Hernia Cerebri, in Haller. Diss. Chirurg. t. 2, p. 333.

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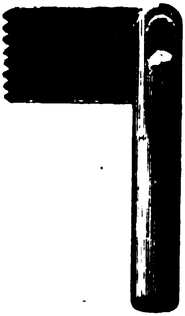

Published April 1 1809 by R.Phillips Bridge Street, Blackfriars, London.

H. Coop

and the circumscription of which depends on the extent of the deficiency of bone.* The proper treatment of this case is to keep up a moderate pressure on the swelling. M. Ferrand successfully employed for this purpose a compress, containing a piece of sheet-lead, and fastened to the child's cap exactly over the tumor. The degree of pressure was increased or diminished, as occasion required, by tightening or slackening the cap.

Another species of encephalocele is rather to be regarded as a malformation, being the consequence of a congenital deficiency of an extensive portion both of the cranium and scalp. In such cases, the infant is generally still-born, or dies soon after birth. A remarkable example of this disease has lately been published by Mr. Burrows. The scalp, the os frontis, the parietal, and a great part of the occipital bones were wanting. The cerebrum, which projected through the deficiency, was of a mulberry colour, and the tumor was adherent at its neck to the edge of the integuments. This child lived till the sixth day after its birth; it had no power of voluntary motion, and all the secretions were stopped.† In one case, where there was a deficiency of the skull at birth, the plexus choroideus was found in the contents of the tumor under the scalp; and, in another instance, the cerebellum.‡

The foregoing kinds of encephalocele are rare compared with others, which sometimes follow the destruction of a part of the skull by disease,§ or the operation of trephining. In the latter case, the tumor generally arises a few days after the perforation of the cranium. It protrudes through an ulcerated opening of the dura mater, and very soon attains the magnitude of a pigeon's or hen's egg, the pia mater covering it seeming inflamed. As it enlarges, frequent hemorrhages occur, and its surface is commonly darkened with coagulated blood. In a few cases, it is not attended with loss of the mental faculties, though in most instances, we find that coma, insensibility, and other marks of pressure on the brain accompany the disease.

According to Mr. Abernethy, this singular malady seems to proceed from an injury done to a part of the brain at some distance from its surface, which injury produces a diseased state of the vessels, similar to what occurs in apoplexy. The morbid state increasing, one or more vessels give way, and an effusion of blood into the substance of the brain follows. This occurrence, if the skull were entire, would probably occasion apoplexy; but when there is a deficiency of bone, that allows the brain to expand, this viscus and its membranes protrude through the aperture. The dura mater soon ulcerates, and the tumor rapidly increases, in proportion as the internal hemorrhage goes on. At last, the pia mater, and stratum of the brain, covering the effused blood, give way, and the blood oozes out and coagulates.*

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* Ferrand, Mem. de l'Acad. de Chirurg. tom. 5.

† Medico-Chirurgical Transactions, vol. 2, p. 52.

‡ See Richter's Anfangsgr. der Wundarzneykunst, band. 2, p. 198, edit. 3.

§ Richter's Chir. Biblioth. 2 B. 1 St. Seite 159.

Besides the hernia cerebri described by Mr. Abernethy, there are other kinds mentioned by surgical writers. Thus we have on record the account of a man, who, without having any previous disease or accident, became afflicted with a pulsatory swelling, which originated from the substance of the anterior part of the left lobe of the brain, protruded through the os frontis, was as large as an orange, and on dissection, was found to resemble the medullary matter of the cerebrum in appearance, and to be covered by an elongation of the dura mater.† This case is very different from all the preceding.

The last species of encephalocele is that described by Mr. C. Bell, though it does not seem certain, whether it is not the same case as that treated of by Mr. Abernethy, only with different opinions concerning its formation. The first of these gentlemen argues, that the swelling is a true organized vascular excrescence from the substance of the brain, and not a mere coagulum as the latter has stated; and he affirms, that he has seen the disease arise after an exfoliation of the two tables of the skull, when no blow had happened to cause any rupture of blood vessels within the brain; and he conceives, that the removal of bone and the ulceration of the dura mater always precede the growth of the fungus.‡

The proper line of surgical conduct in such cases as follow trephining, is hardly yet determined. Mr. Hill successfully pared off the tumor with a knife in several instances;§ and patients have been known to tear off the whole tumor without any particular ill consequences ensuing.|| We should not expect these facts *a priori*, and considering the history of the disease. The French surgeons recommend either cutting the tumor away, or repressing its growth by applying turpentine to it, and gentle pressure.¶ When the hernia cerebri is free from urgent symptoms, perhaps, the surgeon acts rightly, who restricts his interference to applying simple dressings. The patient might also be very freely

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* Surgical Works, vol. 2, p. 51.

† Med. Trans. art. 18.

‡ Operative Surgery, vol. 1, p. 428.

§ Cases in Surgery, p. 91, 92.

|| Mem. de l'Acad. de Chirurg. tom. 1, Mem. par M. du Quesnay, obs. 10.

¶ Richerand Nosogr. Chirurg. tom. 2, p. 289, edit. 2.

bled, just as if the case were an apoplexy, supposing Mr. Abernethy's account to be correct. If there were urgent danger from the degree of hemorrhage, the latter gentleman thinks, that the surgeon would be warranted in removing the surface of the tumor, and trying whether exposure of the internal bleeding vessels would stop the mischief. When, under the use of mild dressings, the swelling enlarges much, Mr. Abernethy seems to approve Mr. Hill's plan of paring away the tumor with a knife; and when the symptoms of irritation and pressure on the brain still increase, he suspects, that the coagulum, from want of room to protrude, is spreading internally, or else by plugging up the orifice in the bone is confining fluid under the cranium. Here he suggests the removal of more of the skull.

Unfortunately these are generally complicated cases, the pia mater being inflamed, and the brain in a morbid state.

CHAP. III.

FUNGOUS TUMORS OF THE DURA MATER.

FUNGOUS tumors sometimes grow from the external surface of the dura mater, and, after destroying the super-incumbent portion of the cranium, make their appearance in the form of an external swelling under the scalp. This disease is generally preceded by a blow or fall on the head, and occurs at the part, to which the violence was applied. The French surgeons, who seem to have paid more attention to this subject than we have, conceive, that the disorder is in some instances an effect of syphilis; an assertion, however, which appears to me very imperfectly confirmed, being mostly founded on the accidental circumstance of certain patients afflicted with fungous tumors of the dura mater having previously had venereal complaints. But, frequently, on this principle, the disease might with equal probability be referred to several other morbid affections.

As the fungus grows larger, its pressure against the skull, and particularly its pulsatory motion derived from that of the brain, occasion a slow and gradual absorption of the bone, just in the same way as an aneurismal tumor destroys any part of a bone against which it happens to press. The portion of the cranium immediately over the swelling being absorbed, the fungous excrescence meets with less resistance; it quickly protrudes through the opening in the skull; forms a prominent tumor under the scalp; and enlarges with increased rapidity. The severe pains in the head, which precede the appearance of the disease externally, become still more violent as soon as the fungus protrudes through the opening in the bone, and is irritated by the sharp inequalities of the edge of the aperture. The swelling has a manifest pulsation corresponding to that of the arteries, and when compressed, it either returns entirely within the cranium, or is considerably lessened. The pain then subsides, the tumor being no longer irritated by the irregular circumference of the opening in the skull. But should the size of the fungus be large, no relief can be thus obtained; for, when an endeavour is made to reduce the tumor, all the alarming symptoms of pressure on the brain are immediately excited.

Fungous tumors of the dura mater constitute an exceedingly dangerous disease, and mostly prove fatal.

Before a fungus of this description has made its way through the cranium, and projected under the scalp, so that its nature and existence can be ascertained, the practitioner has no opportunity of attacking the disease with any effectual means. The ordinary treatment of the severe pain occurring in certain parts of the head, after blows or falls on the cranium, and before the fungus protrudes, has consisted of bleeding and evacuations. But when the disease has manifested itself in the form of an outward swelling, the nature of which is recognized by previous circumstances, as well as by the pain which attends it, and subsides on its reduction, and its pulsatory motion; the surgeon should have the head shaved, make a crucial incision in the scalp covering the fungus, dissect up the angles, and fairly bring into view the whole of the tumor, and the margin of the opening through which it protrudes. But as it is impossible to get at the entire root of the fungus, while it is closely embraced by the cranium, it becomes necessary to saw away the surrounding bone. This object has generally been accomplished very inconveniently with the trepan or trephine, which, while it cuts away more of the cranium than is requisite, cannot effect the removal of every part of the bony circumference, and the surgeon has to break away the pieces betwixt the perforations with a gouge and mallet after the manner of the French surgeons. The best instruments for cutting away the surrounding part of the cranium, are the saws described by Mr. Hey, and represented in plate 3 of this work. With these, the division of the bone may be made in any direction desirable.

The root of the fungus being thus exposed, the next business is to cut the swelling away, which is most effectually done by carefully dissecting out the part of the dura mater, with which it is connected.

The preceding operation is not practicable, when the fungus protrudes at the orbit, or very near the ear. The upper part of the head is evidently the most favourable situation for such a measure.

The excision of fungous tumors of the dura mater is far better practice, than applying ligatures or caustic to the disease. Tying these swellings would almost certainly induce a fatal degree of inflammation of the brain and its membranes; and with respect to caustic, (to say nothing of its inferior efficacy,) it is always liable to extend its action to the cerebrum itself.*

CHAP. IV.

TINEA CAPITIS.

THIS disease consists of cutaneous ulcers, which affect the scalp, and are concealed beneath thick, dry, whitish, yellowish, or greenish scabs. When these are removed, a thin discharge of a very peculiar fetor is effused; the hair falls off, and the surface of the cutis underneath has a red excoriated appearance. From being at first of small extent, the disease is apt to spread in such a degree, that it not unfrequently occupies not only the whole of the scalp, but also some of the surface of the adjacent parts. Sometimes the complaint arises without any evident cause; and sometimes it is communicated from one person to another by contact. No age is exempt from its attack; it is often very obstinate, and very apt to recur repeatedly. Uncleanliness seems particularly conducive to the disease; and hence poor persons are more frequently affected than the higher classes. Children are more subject to it than adults.

TREATMENT.

To loosen and remove the scabs; to keep the sores clean and covered with proper applications; to have the affected part of the scalp shaved; and to exhibit suitable alterative medicines; are the chiefs objects to be observed in the treatment.

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* See the Essay on Fungous Tumors of the Dura Mater, by M. Louis, in Mémoires de l'Académie de Chirurgie, tom. 5, 4to.

The hair being carefully removed, and the scabs rubbed with fresh butter so as to facilitate their separation, the scalp should next be well washed with common soap and a flannel. The part affected is then to be dried and covered with an ointment formed of those of pitch and sulphur in equal proportions. The head is to be washed in this manner regularly every day; and the hair is to be cut off at least once every two days.

In a few instances, the above application seems to have little effect; and in such, the ung. hydrarg. nitr., or a lotion composed of a pint of lime water and two drams of the kali sulphuratum, may be advantageously tried. A decoction of tobacco is another remedy in great repute.

In obstinate cases alone, internal medicines need be given. One of the best is an alterative pill, containing a grain of calomel, the same quantity of the sulphur antim. præcip. and two grains of resin of guaiacum. This may be given twice a day.

I have also seen the compound decoction of sarsaparilla given with obvious benefit.

CHAP. V.

WOUNDS OF THE FACE.

IN this chapter, it will only be proper to notice a few particulars relating to wounds in this situation.

The countenance being the place, in which deformity is peculiarly conspicuous, it is always a great point to prevent the formation of ugly scars. Hence, it is almost an invariable maxim to endeavour to heal wounds of the face by the first intention.

As cuts of the face cannot be deep, adhesive plaster is generally sufficient to keep them closed; but, when the wound is situated in one of the lips, these parts are so incessantly in motion, that surgeons find it advantageous to maintain the sides of the division in contact by means of the twisted suture, of which I shall give a description in the chapter on the hare-lip.

When the edges of the wound are much contused and lacerated, some authors advise paring them off, in order to increase the chance of union, and lessen the vestiges of the future scar.

Sabre-strokes directed obliquely downward against the face, very often produce a wound attended with a flap, which should be immediately laid down in its proper situation again. When such flap is large and muscular, Richter thinks it best to use a suture at one or two points, as the strips of adhesive plaster are apt to become displaced, especially if the patient is restless, and the flap of skin, not being sufficiently retained, slips downwards, and the part is not healed without deformity.

I conceive, however, that, when the adhesive plaster is assisted with a compress and bandage, a suture in this instance may be dispensed with.

Sabre-wounds sometimes break and splinter the bones of the face. The fracture, however, seldom extends far, because most of these bones are soft and spongy. Notwithstanding such injury of the bones, the wound of the soft parts frequently admits of being united, if the surgeon takes care to extract all the splinters, and put the surfaces of the division of the bones as evenly together as possible. Unless the fragments are quite detached, they should never be taken away, but be replaced as well as circumstances permit. Their removal is not an easy matter; it occasions an unpleasant disfigurement; and experience proves, that all divisions of the bones of the face heal with particular readiness.*

Wounds of the lower part of the forehead or eyebrow, are sometimes followed by the disorder named *ptosis*, in which the upper eyelid hangs down more or less over the eye; but more commonly they give rise to an opposite complaint, called *lagophthalmos*, in which, from a contraction of the cicatrix, the skin is drawn up, and the upper eyelid cannot be made to cover the eye. But, of these cases, I shall have to speak in a future chapter.

Wounds of the eyebrows sometimes cause a species of blindness, named the gutta serena. This consequence is commonly thought to be owing to an injury of the nervous filament, which comes out of the orbit, at the notch in the superciliary ridge. It is very probable, however, that the affection of the eye is not altogether dependant on the injury of the nerve; for, the blindness very often occurs, when the cut is not situated near the track of the nerve, and frequently does not occur, when the nerve is known to be divided. It is when the wound is nearly or quite healed, that the event is most likely to happen.

Scarpa has set down the gutta serena, arising from an injury

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* Anfangsgr. der Wundarzn. band 2, p. 244, edit. 3.

Desault cured a salivary fistula of the parotid duct by means of pressure, but quite on a new principle. After compression of the duct had been tried in vain, he laid compresses over the parotid gland, and bound them on the part with a roller, enjoining the patient to live entirely on liquid food, and abstain from talking. The bandage was tightened anew every day. By pursuing this method a certain time, the gland wasted away, its function was abolished, no more saliva passed into the duct, and the fistulous opening healed. According to Bichat, Desault frequently adopted this mode, and we are informed, there is no reason to apprehend any disorder of the digestive organs from a less quantity of saliva being secreted, as the opposite parotid, and the rest of the salivary glands, make up the deficiency, by augmenting their secretion.*

The application of caustic to the fistulous aperture, is another means. This is practised with a view of producing an eschar sufficient to close the opening, and prevent the issue of the saliva. In order to make the slough continue undetached long enough for the fistula to heal underneath, it is recommended to bathe it frequently with brandy, or strong astringents. This plan cannot succeed, unless the outward aperture be very small, and the saliva have some other fistulous channel, by which it can escape into the mouth.

Efforts have been made to re-establish the obliterated part of the duct, by passing a probe from the fistulous aperture through it, and keeping it open by a seton, introduced in this manner into the mouth. A degree of success has certainly attended this method.

It is obvious, however, that there is no occasion to re-establish the obliterated part of the duct; and it is not so easily accomplished as making a new and more direct channel for the saliva into the mouth. This plan is also attended with greater success. The perforation is best made by means of a small trocar; and the puncture should be made so close to the end of the fistula, as to be, as it were, a continuation of it. The wound is to be prevented from healing by a seton, which is to be worn a reasonable time.

Desault's method of applying the seton is unquestionably the most eligible. When the trocar had been introduced, he used to withdraw the stilette, and pass through the cannula a thread into the mouth. The tube was then taken out, and the seton was drawn, by means of the thread, from within the mouth outwards into the track of the wound; but, care was taken not to draw it through the external opening, out of which the single thread alone passed, and was then fastened to the cheek with a bit of sticking plaster. The outer aperture was now dressed with lint, covered with compresses wet with the saturnine lotion. Thus the external opening had an opportunity of healing, with the exception of a mere point which soon closed; the seton, after being worn long enough, was taken out, and the little aperture touched with the argentum nitratum.*

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* Œuvres de Desault, par Bichat, tom. 2, p. 218—220.

The foregoing plan is much better, than that practised by the famous Monro, who used to employ a seton, which was equally thick both in the inner and outer part of the wound. It is also more convenient and more likely to succeed, than the method, which some practitioners have adopted, of leaving the cannula of a small trocar in the cheek, while attempts are made to heal the external opening.

During the treatment of these cases, it is necessary to make the patient refrain, as much as possible, from masticating, or talking, and his confining himself to liquid food is highly advantageous.

CHAP. VII.

HARE LIP.

THIS is, for the most part, an original malformation from the time of birth. In a few instances, it is the consequence of a wound. It is mostly met with in the upper lip, and very seldom in the lower one. Sometimes, there is only one fissure; on other occasions, there are two. When, in the latter instances, the intervening substance is sufficiently broad and long, it is best to preserve it in the operation; but, if narrow and short, it should be cut away. In some cases, the fissure only extends as high as the middle of the lip; in others, it reaches to the nose, and even into one of the nostrils. In the latter circumstance, the nostril is very much expanded, and much wider, than its fellow. Besides the fissure in the lip, there is frequently so large a cleft in the upper jaw and palate bones, as to make the cavities of the mouth and nose, as it were, into one. Sometimes, there is a fissure in the soft palate; though, for the most part, this is perfect. In certain examples, the jaw bone, or teeth, project forward into the cleft of the lip.

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* Œuvres de Desault, par Bichat, tom. 2, p. 221—225.

This case is not only a great deformity, but is attended with a defect in the speech; and, when the fissure extends along the palate, more or less impediment to the power of sucking and swallowing also exists.

The hare lip is cured by an operation, in which the surgeon pares off the margin of the fissure, brings the fresh cut surfaces into contact, and keeps them in this position, until they have grown together by the first intention.

As infants are very subject to convulsions after operations, modern surgeons seldom undertake the cure till a child is about two years of age.

In the operation, the object is to make the wound as smooth and even a cut as possible, in order that it may more certainly unite by adhesion, and, of such a shape, that the cicatrix may form one narrow line. The margins of the fissure ought never to be cut off with scissars, as these instruments always bruise the fibres, at the same time, that they divide them.

Since the days of M. Louis, this sentiment has been adopted by most of the first surgeons in Europe. Richter, Desault, and a few others, however, refuse their assent to it, contending that, in practice, the knife has no superiority, and that scissars possess several advantages, as, for instance, fixing the part as well as dividing it, not requiring in general a previous separation of the lip from the gum, as the introduction of the piece of pasteboard, or spatula, does, on which the lip must be fixed, before the incisions can be made with a knife, &c.

The best plan is, either to place any flat instrument, like a spatula, the handle of a wooden spoon, or a bit of pasteboard, underneath the lip, and then cut away the edge of the fissure with a sharp bistoury; or, to hold the lip with a pair of forceps, in such a manner, that as much of the edge of the fissure as is to be removed, is situated on one side of the blades of the instrument, so that it can be cut off with one sweep of the knife. This is to be done on each side of the cleft, and the two incisions are to meet at an angle above, thus Λ, in order that the whole track of the wound may be brought together, and united by the first intention.

The lips are so exceedingly moveable, and it is so very desirable, in this case, to heal the wound by adhesion, that a particular process is always pursued to keep the lips of the wound in contact. Two silver pins, made with steel points, are introduced through the edges of the wound; and a piece of thread is then repeatedly wound round the ends of the pins, from one side of the division to the other, first transversely, then obliquely, from the right or left end of one pin above, to the end of the lower on the opposite side, &c. Thus the thread, being made to cross as many points of the wound as possible, greatly contributes to maintain its edges in even apposition. It is obvious, that a great deal of exactness is requisite in introducing the pins, in order that the edges of the incision may afterwards be precisely applied to each other in the proper manner. The pins ought never to extend more deeply, than about two-thirds through the substance of the lip. It would be a great improvement always to have them constructed a little curved. This is what is named the *twisted suture*. The pins may usually be removed in about four days, the support of sticking plaster being afterwards quite sufficient.

That hare lips may be cured, without the employment of any suture at all, is a fact, of which abundant proof may be found in surgical authors. M. Louis, one of the most enlightened surgeons that ever flourished, has not only brought forward many plausible arguments in favour of treating these cases, without sutures; but, has demonstrated the success of this practice in the instructive field of experience. He considered, that, in cases of hare lip, authors generally recommended sutures, on the generally erroneous supposition of there being an actual loss of substance, and he was of opinion, that the only power to be surmounted, was the action of the muscles. Hence, he laid it down as a principle; 1. That the power, which is to bring the sides of the fissure in contact, should not operate on the edges themselves, but, on the muscles, which draw them asunder: 2. This power should be made only by the uniting bandage: 3. The suture is a means of contact, and not of approximation, with regard to the lips of the division: 4. Adhesive plasters suffice for maintaining such contact, and, as not creating so much irritation as sutures, ought always to be preferred.*

These observations, however, have not been here introduced, with any view of recommending M. Louis's method. His principles are correct; but, his practice has this serious objection, that, unless conducted with more care and attention, than the generality of surgeons will bestow, it is apt to fail. Indeed, its success, in some measure, depends on the child's remaining quiet; while the twisted suture cannot thus be disturbed; though the muscles may tend to separate the sides of the wound, their action is in vain, as long as the pins do their duty; and, that the latter do almost constantly keep the lips of the wound effectually together, until the necessary union is accomplished, is proved by daily experience.

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* See Mém. de l'Acad. de Chirurgie, tom. 12 and 14, edit. 12mo.

Hare lips are frequently complicated with a fissure extending along the roof of the mouth. When such division is confined to the upper maxillary bones, it generally closes after the operation; but, when it reaches along the palate bones and velum pendulum palati, its entire closure takes place with less frequency. Whatever was the form of the division in the palate, the experience of Desault taught him, that, if these cases did not invariably admit of an exact union, they at least underwent material improvement, the sides of the fissure becoming in time considerably nearer together. As, in these examples, the complaints, arising from the imperfection of the palate, are urgent, the operation should be done at an early period.*

When a hare lip is complicated with a projection of the upper jaw forwards, the deformity may be of several descriptions.

Sometimes one upper maxillary bone exceeds the level of the other. In some instances, where the hare lip is double, a distinct part of the jaw pushes forward the middle portion of skin. In certain cases, one of the maxillary bones inclines backwards, and its alveolary process juts out. In other examples, an impediment to the union of the hare lip arises from the projection of a tooth, which must then be extracted.

The treatment of the projecting jaw itself, however, has been treated in two ways. The common preliminary step to the operation for the hare lip, has been to cut away the bony prominence. Such was the practice of Franco, and Van Horne, and various cases, in which it was done by Gérard, and La Faye,† are on record. But, according to Desault, this measure is seldom necessary, and always very painful. If an interval must elapse between the performance of this, and the attempt to cure the fissure in the lip, the patient must submit to two operations. Should both objects be undertaken at the same time, the inflammation excited, may hinder the union of the wound. But, besides these things, a depression of the bone always exists afterwards, so that, when the deformity of the hare lip is removed, a disfigurement of the face yet follows, from the upper lip having no proper support. With these objections, another serious one is adduced; namely, the transverse diameter of the upper jaw is apt to diminish so much, in proportion as the two maxillary bones coalesce, that the upper and lower jaws no longer correspond, and the same kind of inconvenient mastication is produced, which may often be observed in old people. A case, illustrative of this fact, is related by Bichat. It happened in the practice of Desault, and, with the other reasons stated above, led this eminent surgeon afterwards to prefer reducing the projection of the jaw, by means of the pressure of a tight bandage. The method was found to answer every expectation; for, as there is always at the same time a fissure in the roof of the mouth, the bony prominence has little support, and readily yields.*

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* Œuvres de Desault, par Bichat, tom. 2, p. 203.

† Obs. sur les Becs de Lievre, &c. Mém. de l'Acad. de Chir. tom. 3, p. 181, in 12mo.

CHAP. VIII.

CANCEROUS DISEASES OF THE LIP.

WHAT is usually called a cancer of the lip, is met with in various forms: sometimes it has the appearance of an ulcerated, wart-like, excrescence, which occasionally becomes as large as an apple; sometimes it is seen in the form of a very destructive ulcer, which consumes the surrounding substance of the lip; and, in other examples, the disease resembles a hard lump, which at length ulcerates. The disease in its infancy is often no more than a pimple, which gradually becomes malignant.

Cancers of the lip are said to be more frequent in men, than women, and to occur generally in the lower spheres of life.† The under lip is commonly the seat of the disease, the upper one being but seldom affected.

All obstinate hardness and ill-conditioned ulcers on the lips, are not always cancerous; many may be cured by the remedies mentioned in the chapter on cancer. A course of emetic and purgative medicines has sometimes accomplished a cure. Black hellebore, internally administered, is said to be particularly efficacious in many instances. Keeping the constitution under the influence of either mercury, cicuta, or opium, may be tried on other occasions. The internal exhibition of the kali arsenicatum, may also be resorted to, when other medicines fail. Very foul ulcers on the lips are occasionally quite dependent on the projection of a sharp, rough tooth against the parts.

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* Opere cit. p. 206—208.

† Pract. Obs. on Cancer, by John Howard, p. 54.

Whenever there is reason to believe, that the disease is of an unyielding cancerous nature, the sooner it is extirpated the better. For this purpose, some surgeons admit the propriety of using caustic, when the whole disease can be completely destroyed by one application. But, as the action of caustic is not capable of being regulated with so much precision, as the extent of a wound can be, the knife is generally preferable: it is also the least painful.

The operation should be done as for the hare lip, making the wound of such a shape as will allow its edges to be evenly united by adhesion, and taking care to extirpate every portion of the morbid part. When the affection is extensive, the surgeon, however, is frequently necessitated to remove the whole of the lip; a most unpleasant occurrence, as the patient's saliva can only be prevented from continually running over his chin by some artificial, mechanical, contrivance, while the deformity is very great; and swallowing, and the pronunciation of words, can only be imperfectly performed.

CHAP. IX.

DISEASES OF THE ANTRUM.

THE antrum is the seat of various diseases. Its membranous lining may inflame and ulcerate; polypi, and other fleshy excrescences, may grow in it; the mucous secretion of the membrane may be of bad quality; and the opening, through which the mucus naturally passes into the nose, may be closed. The bony parietes of this cavity may be carious, or may form osseous funguses.

Penetrating wounds of the antrum may be caused by various weapons; it is liable to fractures; and, in gunshot injuries, extraneous substances may be forced into it.* In this elementary work, an account of the most common cases can only be expected.

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* See two excellent dissertations "Sur les Maladies du Sinus Maxillaire, par M. Bordenave, in Mém. de l'Acad. de Chir. tom. 12, and 13, edit. 12mo. or 4, and 5, 4to.

INFLAMMATION AND SUPPURATION IN THE ANTRUM.

The first symptoms are difficultly understood. There is a darting pain in the side of the face, extending from the teeth to the orbit, and unattended with any external swelling. The pain and tenderness do not affect the integuments, which may be handled without inconvenience to the patient. This state of the disorder is not attended with much fever, and is usually regarded as a tooth-ach.

In some instances, matter flows into the nose; and, its being discharged from one of the nostrils, excites a suspicion of the nature of the case. But, many patients do not distinguish the pus from the usual mucous evacuation; and, frequently, in consequence of the communication between the nose and antrum being closed, there is no purulent discharge whatever.

The disease, when more advanced, becomes more obvious. The whole antrum now expands, and its parietes are rendered thinner by absorption. The expansion of the bone towards the nose, may produce a complete obstruction of the nostril, or its swelling above may raise the floor of the orbit, and push the eye out of its situation. But the greatest degree of expansion commonly takes place towards the surface of the body; for, all collections of matter have a natural tendency to burst externally.

At length the abscess makes its way through the bony parietes of the antrum, and continues to be discharged through ulcerated openings. In some instances, the matter finds a passage into the mouth, through one of the sockets for the teeth.

Although the diagnosis is generally rendered sufficiently plain by the foregoing train of symptoms; yet, writers mention a few exceptions, in which the fistulous external aperture, being situated very remotely from the seat of the disease, as, for instance, behind the ear, no suspicion of the case being an abscess of the antrum would be excited, were it not for the swelling of the cheek, &c.*

The most common cause of suppuration in the antrum is a caries of one, or more of the upper grinding teeth. The general causes, however, capable of exciting local inflammation in any situation, may also have the same effect in the present one. An obstruction of the opening, through which the mucus flows from the antrum into the nose, may create such an accumulation of this secretion, as shall occasion suppuration.

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* See Poulain, Journal de Médecine, tom. 36.

The indications, in the cure, are chiefly two, viz. to procure a vent for the matter confined in the antrum as speedily as possible; and to check the suppuration, and promote the separation of any exfoliations, which are taking place.

When there is any carious tooth below the antrum, the surgeon should always extract it, as was first proposed by Meibomius,* for, thus he not only removes a source of great irritation, but, frequently, makes at once a depending opening into the antrum. When the fang of the tooth does not extend quite into this cavity, the perforation must be completed with a sharp gimlet. Desault contends, indeed, that, whether the fang reaches to this distance or not, it is always necessary to make the opening larger with a perforator.† If all the teeth are sound, the third or fourth grinder is to be selected.

Desault used to enlarge the opening, after the extraction of the tooth, with a perforator, resembling that contained in cases of trepanning instruments; but, he only used a sharp pointed perforator, when he had to drill a hole through the bottom of the socket; for, in other instances, where the object was merely to enlarge the opening, already extending into the sinus, he took care to employ a blunt-pointed perforator, with which there was no risk of injuring the opposite side of the antrum. This distinguished practitioner thought, that the aperture should always be made large enough to be capable of admitting the little finger. The pain and swelling, following the operation, are to be lessened by fomentations; and injections of barley water and mel. ros. into the sinus are afterwards to be made.‡

There are cases, in which fleshy, or bony funguses, or detached portions of dead bone, are situated in the antrum, and, in which examples, it is requisite to make a larger opening into this cavity, than can be obtained at its lower part. Instances also occur, in which the patients have lost the grinding teeth, and the sockets are quite obliterated, so that a perforation from below could hardly be effected. The importance of the molares in mastication also made Desault averse to extracting any of them, unless they were diseased.

In such cases, practitioners have usually followed the method, which was recommended in the Mem. of the French Acad.

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* Diss. de Abscessibus Internis, Dresd. 1718.

† Œuvres de Desault, par Bichat, tom. 2, p. 159.

‡ Op. cit. p. 160, 161.

of Surgery, by Bordenave and Lamorier, and which consists in perforating with a small trephine the malar process of the upper maxillary bone. But, there can be little doubt, that Desault's plan is preferable. After detaching the inside of the cheek from the bone; and exposing the surface of the latter, he drilled a hole with the perforator into the sinus, at the lower part of the fossa canina. The aperture was then enlarged to the requisite extent with the blunt perforator; the corresponding part of the gum was cut away; and a dossil of lint was placed in the opening. For a few days, the cheek was covered with an emollient poultice, and, after the removal of the dressings, the cure was completed by the use of gargles and injections, and taking care to keep the perforation open a sufficient time by occasionally introducing into it the little finger. The great recommendations of the situation, in which Desault made the opening, were the thinness of the bone there, and the advantages arising from the part being less remote from the mouth.

The detachment of carious portions of bone is altogether the work of nature; the only way, in which the surgeon can be useful, being to extract, through proper incisions, such exfoliations as are already loose. The fistulous sinuses generally require dilating, in order to allow the pieces of bone to be taken away. If there be no caries, the ulcerations usually heal spontaneously, when the matter in the antrum has a depending opening, through which it can readily escape.

FUNGUSES OF THE ANTRUM.

The worst diseases, to which the antrum is liable, are fungous, and other, tumors growing in its cavity, and producing first an enlargement, and then a destruction of its bony parietes. These frequently cause all the neighbouring teeth to fall out, and the eye to be displaced from its socket. The excrescence makes its way through the alveolary processes into the mouth, and, by expanding the bones, renders the adjacent nostril quite obstructed. At last, the swelling protrudes through the cheek, and assumes a very frightful aspect.

The proper mode of treating this case is to trephine the antrum, as soon as the existence of the disease is known; and to make such a free opening into the cavity, that every atom of the fungus can be conveniently cut out. It is an unfortunate truth, however, that this terrible disease is seldom attacked in the bold and judicious manner advised and practised by the great Desault, who saw more danger in tampering with such a case, than in the most decisive measures.

The main object, which this surgeon always had in view, was to remove an adequate portion of bone, so as to allow the distemper to be effectually destroyed at its root. His practice consisted in drilling a hole in the antrum with the perforator, and then cutting away the anterior bony parietes of this sinus, with a strong falciform knife, constructed for the purpose; and, if, with this instrument, he could not remove bone enough, he scrupled not to effect his design by means of a gouge and mallet. Rather than suffer the disease to remain unextirpated, he sometimes broke away part of the alveolary process, with the corresponding teeth. As much of the fungus, as could be cut away, was then removed, and the surface, from which it grew, was afterwards carefully cauterized. In England, the generality of surgeons would substitute caustic for the cautery; though I am decidedly of opinion, that, if the latter means is ever necessary, it must be in cases of this formidable character.

Tumors, growing from the antrum, are sometimes of a bony nature.

CHAP. X.

NOLI ME TANGERE.

THIS term is applied to a species of herpes, which is frequently seen making its attack on the skin of the nose. The disease consists of small, superficial ulcerations, which usually commence on the alæ of the part, and are, more or less, concealed beneath furfuraceous scabs. The complaint is connected with specific morbid action in the part affected, and the matter secreted seems to have the power of infecting the adjoining skin, to which it is applied. Hence, the noli me tangere often proves exceedingly obstinate, spreading on one side, healing on another, and then breaking out again in places where, at one time, the complaint seemed to have entirely ceased.

I have repeatedly seen nearly the whole nose gradually destroyed by this frequently intractable malady. I have several times seen the morbid process suspended for six months, or even a year, and then renew its ravages with increased vehemence.

Such authors, as have attempted to explain the causes of this species of herpes, have only displayed their own credulity, without throwing the least light on the subject.

TREATMENT.

In these cases, it is generally useful to employ internal alterative medicines, as well as topical applications.

It will only be possible to notice, in this work, a few medicines, which seem to deserve a trial, in preference to many others.

The solution of arsenic may be taken internally, in the way mentioned in the chapter on ulcers. Arsenic may also be safely exhibited in the following formula:

℞ Kali arsenicati, gr. ij.
Aq. menth. sativ. ℥iv.
Spir. vin. ten. ℥j.—Misce et cola.
Dosis ʒij ter quotidie.

This formula, with double the quantity of arsenic, makes a very eligible local application, in cases of noli me tangere. I have lately seen it employed in two, or three cases, with immense advantage.

In other instances, in which arsenic is not given, we may exhibit twice a day a pill, containing a grain of calomel, a grain of the sulphur antim. præcip., and two grains of the resin of gum guaiacum. Sometimes, the decoction of sarsaparilla, and a pill, composed of three or four grains of the succus cicutæ spissatus, and a grain of calomel, given thrice a day, have apparently produced very good effects. Æthiops mineralis is also sometimes useful.

With respect to external applications, the ung. hydrarg. nitr., the ung. picis, and ung. sulphuris, deserve to be mentioned. There is some inconvenience in applying fluid remedies to the outside of the nose; but, I believe, they are generally more beneficial in cases of noli me tangere, than any other application. The solution of lunar caustic (℈j. to ℥ſs. of water) may be applied by dipping very small, soft pieces of lint in it, placing them accurately on the little ulcerations, by means of a probe, and then covering the nose with a pledget of the ung. sperm. cet., or, if judged necessary, one of the ointments above enumerated. The solution of arsenic, mentioned above, is to be used in the same manner. In some instances, it answers better to touch the little sores with the lunar caustic itself, before covering them with a dressing.

The scabs should be, every now and then, softened with the ung. sperm. cet., and removed with as little irritation as possible.

CHAP. XI.

FISTULA LACHRYMALIS.*

WHENEVER the tears cannot pass freely through the ductus nasalis into the nose, the lachrymal sac becomes distended, so as to form a preternatural tumor, situated just on one side of the root of the nose, below the internal angle of the eye. The contents of the sac, however, are not merely the tears, but also the mucus, which the sac itself naturally secretes. In consequence of this state, the tears cannot freely enter the puncta lachrymalia; and, every now and then, a drop of this secretion falls from the corner of the eye down the cheek. On compressing the space between the eye and nose, the tumor is, for a time, diminished, in consequence of its contents regurgitating through the puncta lachrymalia; and also, in some measure (when the obstruction in the nasal duct is slight), by reason of their passing downward into the nose.

This is the first stage of the disease, absurdly named the *fistula lachrymalis.*

The second stage is, when ulceration has formed an external aperture in the lachrymal sac, which ulcerated opening is prevented from healing by the contents of the sac continually oozing through it. This state of the disease sometimes induces a carious affection of the os unguis, and thus the malady becomes more complicated. In most instances, the neighbouring eye is more tender, than in the healthy state, and, in some, it is always more, or less inflamed.

Professor Scarpa asserts, that the chief part of the yellow viscid matter, which accumulates in the lachrymal sac is secreted by the lining of the eyelids, and by the little glands of Meibomius, and that the altered quality of this secretion has a principal share in the cause of the disease. He states, that the truth of

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* Lachrymal parts of the eye. Plate IV. fig. 1.
a. b. The lachrymal sac.
c. The tendon of the *orbicularis palpebrarum* muscle.
d. Punctum lachrymale superius.
e. Punctum lachrymale inferius.
f. Caruncula lachrymalis.
g. Portion of the orbicular muscle reflected from the surface of the lachrymal sac.

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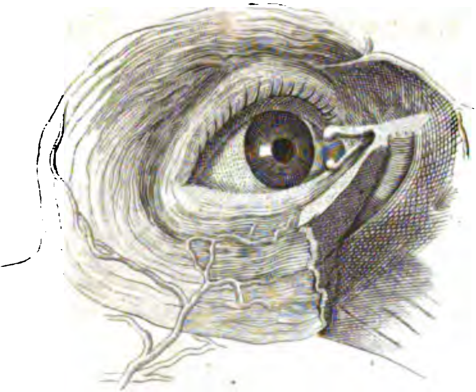

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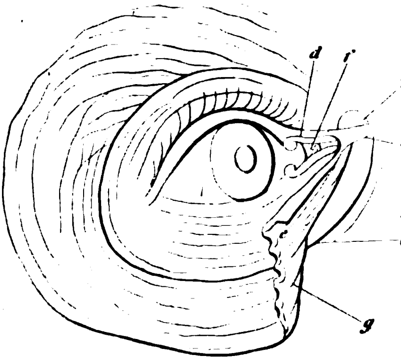

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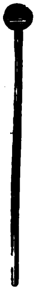

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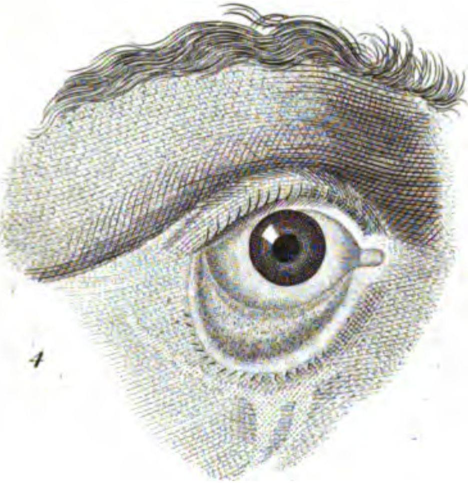

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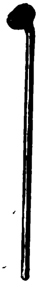

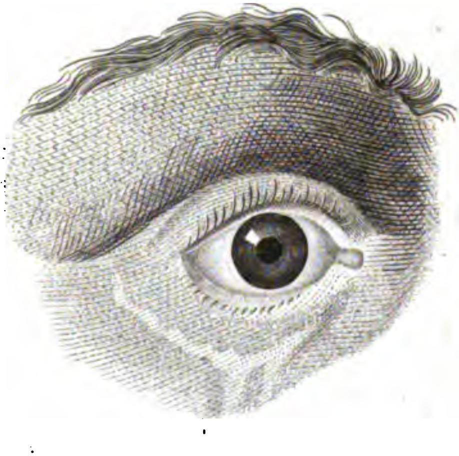

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Published April 1 1807, by R. Phillips Bridge Street, Blackfriars London.

H. Cooper

this fact may at once be ascertained by turning out the eyelids, and especially the lower one of the affected side, and by comparing them with those of the opposite eye. The former will constantly exhibit an unnatural redness of the internal membrane, which appears villous along the whole extent of the tarsus, while the edges are swollen, and numerous varicose vessels are distributed on its surface. The follicles of Meibomius are also turgid and prominent.*

TREATMENT.

The first stage of the fistula lachrymalis, sometimes named the *epiphora*, and by Scarpa called the *purulent palpebral discharge*, may frequently be cured by very simple means. I shall not enter into the question, whether the morbid state of the Meibomian glands, and of the internal membrane of the eyelids, is the cause, or only an effect, of the obstruction in the ductus nasalis. I think the discussion of this point quite superfluous; for, whether it is one, or the other, it is proper to follow the same practice, namely, to make such applications to the inside of the eyelids, as have a tendency to improve the quality of the secretion from them, and to endeavour to restore the free passage of the tears into the nose.

While the lachrymal sac is entire, that is, while the disease is not in an advanced state, the most judicious plan, which the practitioner can possibly follow, is to inject warm water into the lachrymal sac, through the lower punctum lachrymale, by means of Anel's syringe. This is done with a view of mechanically washing away any thickened mucus, or other matter, which may obstruct the ductus nasalis. The fluid should be injected so as to make it pass, if possible, with some velocity into the nose. In 1780, Sir William Blizard proposed the injection of quicksilver, by means of the tube, commonly used by anatomists for injecting the lymphatics; but, Mr. Ware's preference to the syringe is, I believe, perfectly just.† The lachrymal sac, and ductus nasalis, should be washed in this manner, at least, once every day.

At the same time, the patient should employ a collyrium, composed of five grains of zincum vitriol. dissolved in four ounces of aq. ros.; or he should introduce, every morning and evening, between the palpebræ and eyeball, a small quantity of the ung. hydrarg. nitrat. lowered; or of an ointment, consisting of half an ounce of hog's lard, two drams of bole armenic, the same quantity of prepared tutty, and one dram of white precipitate. This is Janin's famous opthalmic ointment, and it must be used, at first, blended with twice or thrice its quantity of lard.

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* Saggio di Osservazioni e d'Esperienze sulle Principali Malattie degli Occhi. Venezia, 1802.

† Obs. relative to the Epiphora, &c. p. 9.

These applications to the inner surface of the eyelids operate very beneficially on the disease, by correcting the morbid secretion transmitted into the lachrymal sac.

Perseverance in this kind of treatment, for two or three weeks, will often effect a complete cure; and Scarpa's practice, whatever we may think of his theory, is undoubtedly commendable.

When the above measures have not the desired effect, or when there is already an ulcerated aperture in the sac, Mr. Ware's method is to be put in practice. A small puncture is to be made into the sac, when there is no external opening, or if this should be unfavourably situated. A very spear-shaped lancet is the best instrument for the purpose. Then a silver probe, somewhat smaller in size, than what is commonly contained in an ordinary pocket case of surgical instruments, is to be introduced through the small puncture into the lachrymal sac, and then through the ductus nasalis into the nose, so as to clear away all mechanical obstructions, and restore the pervious state of the natural channel for the tears. The ductus nasalis is to be kept from closing again by a silver style (plate 4, figs. 2 and 3,) of about the same diameter as the probe, and formed with a flat head, like that of a nail, only placed obliquely, in order that when the instrument is placed in the duct, the top may lie in close contact with the skin covering the sac. The style for an adult should be about an inch and a quarter, or an inch and three-eighths in length. When it is judged necessary to make a small perforation in the os unguis, with a view of forming an entirely new passage from the sac into the nose, the style is also to be worn as in the preceding case.* If the lining of the eyelids be in a morbid state, Scarpa's applications are also to be used.

The style produces so little inconvenience (and one might say no deformity, as its head being blackened has the appearance of a small bit of court plaster), that the patient is generally very careless about relinquishing its employment. The only thing, necessary to be observed, is, to withdraw the style, two or three times a week, and inject warm water through the external opening down into the nose. At the end of six weeks, the instrument may be commonly left off, and the aperture allowed to heal.

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* See remarks on the Fistula Lachrymalis, &c. by J. Ware.

When the os unguis is carious, it may in some instances be proper to make a larger opening into the sac, in order to endeavour to cut away any tedious exfoliations. But, now, that the practice of cramming the sac with tents, escharotics, &c. has given place to the mild methods above explained, caries is found to be a much less frequent occurrence.

The troublesome ulcerations, sometimes attendant on the fistula lachrymalis, commonly heal soon after the ductus nasalis is rendered pervious by the introduction of the probe. In a few examples, this desirable event is prevented by some constitutional causes, which, the exhibition of bark, and the sublimate, generally removes.

CHAP. XII.

DISEASES OF THE EYELIDS.*

INFLAMMATION OF THE EYELIDS, OR PSOROPHTHALMY.

IN the purulent ophthalmy, a thick viscid kind of pus is always found on the edges of the eyelids, gluing them together.

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* The disorders of the eye and its appendages are far more numerous and diversified, than those of any other individual part of the body, and some of the requisite operations for their relief, ought to be done with the nicest combination of skill and delicacy. These circumstances, strangely enough, have had the effect of inducing an erroneous supposition, that such cases do not properly enter into the department of ordinary surgery; but, ought to be consigned to the care of a man, who makes them exclusively the object of his attention, and disregards disease in every other form. The morbid affections of the eye, it is true, like all other surgical cases, must be studied, in order to be understood. They have no peculiarity, however, except what depends upon their number, and the tenderness, and functions, of the organ affected. In their nature, they are swayed by the same laws, which influence all the common diseases, for which the practice of surgery is instituted; and their treatment is regulated by general principles, which prevail throughout the whole of this indispensable art.

The glands of Meibomius are probably the chief source of this discharge. The inflammation generally affects only the edges of the eyelids; but, sometimes, it extends to every part of them, and even to the cheek, where it creates an erysipelatous swelling. The inner edges of the palpebræ are often ulcerated.

Formerly these cases used to prove exceedingly obstinate, and, on the supposition of the disease being scrofulous, various internal medicines were often exhibited, but too frequently without the desired effect. Among other things, the extractum cicutæ, bark, calomel, sea-water, sea-bathing, and a variety of mineral waters, were commonly tried. Although Mr. Ware acknowledges, that psorophthalmy is sometimes accompanied with the plainest marks of a scrofulous constitution; yet, he believes, that it mostly takes place independently of any other complaint; and he thinks, that however judiciously the preceding, or other internal remedies may be prescribed, they are absolutely insufficient of themselves, and must be assisted by proper applications to the part affected. In short, it was this gentleman, who first proposed the successful practice of smearing the edges of the palpebræ with the unguent. hydrarg. nitrat. Let the ointment be put into a small box, and warmed before a candle, till the top is melted into an oil. This oil is to be taken off upon the end of the fore finger, or (what is unquestionably preferable) upon the point of a small pencil brush, and carefully rubbed into the edges of the affected eyelids. The use of it once in twenty-

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I assert, that no one, except the thorough surgeon can make the complete occulist; by which last term, is not meant any body, who can merely manage to extract the cataract better, than the generality of surgeons; but, a man, whose science leads him to recognize the analogy betwixt the diseases of the eye and those of other parts, and whose knowledge of the latter, while it qualifies him in a great measure for the treatment of the former, gives him a decided superiority over the bare occulist.

"On a cru faussement (says the intelligent M Louis, in adverting to the diseases of the eye) que le sçavoir nécessaire pour discerner le caractere de ces diverses affections contre-nature, et pour y remédier, faisoit en quelque sorte un art particulier. Mais quels fruits pourroit porter cette branche, étant separée du trone? Il est bien prouvé, par les faits, que les progrès de cette partie de la Chirurgie ne sont dûs qu' aux grand Mâitres qui ont pratiqué l'Art dans toute sa plénitude, et dont l'expérience, relative aux maladies des yeux, a été éclairée par les lumieres que leur avoient données les principes qui constituent indivisiblement la science, sans laquelle on ne peut exercer aucune partie avec connoissance de cause." Vid. Mém. de l'Acad. de Chirurgie, tom. 13, p. 262, 263, edit. 12mo.

four hours is sufficient; and the best time is when the patient goes to bed. As soon as the pain, excited by the application, has subsided, a soft plaster of ceratum album is to be loosely bound over the eyelids, in order to keep them from sticking together in the night. Still, the eyelids cannot in general be altogether prevented from becoming adherent to each other, and more or less difficulty attends the separation of them in the morning. Hence, Mr. Ware recommends cleansing them with milk and fresh butter, well mixed together, and warmed. This application will gradually soften the incrusted matter, and enable the patient to open his eyes without pain.

When the disease is attended with inflammation of the eyeball, the same gentleman advises the vinum opii to be also used, in the manner described in the chap. on ophthalmy.*

LIPPITUDO.

A chronic inflammation of the lining, and particularly of the edges of the eyelids, is termed *lippitudo.* The eye seems to be surrounded with a red circle, and the palpebræ cannot be easily opened in the morning, owing to a morbid secretion of glutinous matter.

The most successful treatment is to wash the eye frequently in the day time with a vitriolic collyrium, and to melt a little of the unguent. hydrarg. nit. in a spoon, and smear it over the inner surface and edges of the eyelids every night, just before the patient goes to bed. This can be best done with a hair pencil.

In many instances, the complaint is very obstinate, and requires the internal exhibition of alterative medicines.

PURULENT EYES OF INFANTS.

In new-born children, a peculiar inflammation of the eyelids, very remarkable for its suddenness and rapidity, is sometimes seen. These parts become red and swollen, and a yellow, thick, purulent matter is discharged, which sometimes covers the whole front of the eye-ball.

According to Mr. Saunders, the inflammation commences by a slight redness on the inside of the eyelids, particularly about the inner canthus; they are soon covered with a thin gluey matter, which, quickly inspissating, fastens them together, and when they are forcibly opened, a large gush of tears succeeds. The eyelids tumefy very soon; the viscid discharge increases in quantity, and speedily assumes a purulent form, whilst the tumefaction of the palpebræ increases. The vascularity of the conjunctiva now becomes extreme, and its minute colourless vessels are so enlarged, and turgid with arterial blood, that the larger branches, which run beneath it, are totally obscured. The surface of this membrane, indeed, is of a beautiful scarlet colour, and resembles that of a fetal stomach, the vessels of which have been filled with fine injection. The swelling of the palpebræ is so great, that when the child cries, the orbicularis muscle projects the morbid conjunctiva, and, consequently, everts the eyelids; ejecting, at the same time, a considerable quantity of the puriform discharge. As the disease advances, the cornea becomes more or less cloudy. When the affection destroys vision, the cornea is generally penetrated by sloughing, or ulceration, and, through the opening, the aqueous humour escapes, and the iris protrudes. These parts are, at length, followed by the discharge of the crystalline and vitreous humours. Some authors represent the eye, as being sometimes destroyed by suppuration; but, Mr. Saunders has positively denied, that this is the case.*

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* See Ware's Remarks on Ophthalmy, Psorophthalmy, and Purulent Eye, p. 123, 124, edit. 3.

The common method of treating this case, is by applying a campherated lotion, made according to the following formula:

℞ Cupri vitriol. Bol. armen. ā ā ℥iv. Camphor. ʒj. M. F. pulvis, de quo projice ʒj in aquæ bullientis ℔iv. remove ab igne et subsideant fœces.

One dram of this remedy is to be mixed with an ounce of cold clear water. The application may be diluted, or strengthened, if requisite. The best mode of applying it to the inside of the eyelids, is with a syringe, and, in violent cases, this should be done, once or twice, every hour; for, if the discharge be suffered to accumulate under the eyelids, the worst effects on the cornea and vision may be apprehended. Mr. Saunders disbelieved, that the matter itself was hurtful to the eye, as he had seen ulcers of the cornea heal, while the discharge was confined for three days under the eyelids. But, the question appears to me to be, not, whether this fortunate event may not sometimes happen, under such circumstances; but, whether it would generally do so?

Mr. Ware also recommends the eyelids to be covered with a poultice made of the curds of milk, coagulated with alum, and an equal part of unguent. sambuci, or axungia porcini.*

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* See A Treatise on Some Pract. Points, relating to the Diseases of the Eye, by the late J. C. Saunders, p. 3—6.

. Such has been the ordinary and most approved method of treating the purulent ophthalmy of infants. In the posthumous work of Mr. Saunders, however, the indiscriminate use of stimulant injections is condemned. In the commencement of the inflammation, this gentleman recommends the application of a sufficient number of leeches as near the eye as possible, the bleeding from the bites being suffered to continue a considerable time, so as to produce the effect of general as well as local bleeding. Thus, according to Mr. Saunders, the swelling of the eyelids will soon be reduced. The antiphlogistic plan, having been continued a little while, is to be followed by the use of a mild astringent collyrium. Mr. Saunders, in his own practice, employed a solution of from two to six grains of alum in an ounce of distilled water. This gentleman has particularly enjoined the practitioner to correct the disorder of the bowels, which is apt to accompany the attack of the disease. When the stools are green, magnesia and rhubarb are to be prescribed; and when the child is costive, a grain of calomel is proper.

If a sloughy ulcer of the cornea should form, Mr. Saunders advises us to give the extractum cichonæ, a few grains of which may be made into very minute pills, and taken every four hours.

When the eversion of the eyelids keeps up a morbid state of the conjunctiva, after the activity of the disease is subdued, compresses must be employed to restore the palpebræ to their right position. In some cases, the eversion is so great, that it becomes necessary to cut out a considerable portion of the diseased conjunctiva. The unguentum hydrarg. nitrat. may be advantageously used to extinguish the last remains of the disease.†

CONCRETIONS OF THE EYELIDS.

Of this disease, there are two kinds; one, in which the inner lining of one or both eyelids has become adherent to the eyeball; the other, in which the two eyelids have adhered together at their edges, to a greater or less extent.

This complaint is sometimes an original malformation; but, it is most frequently produced after birth by violent opthalmies, burns, &c. When the edges of the eyelids have grown together, the preternatural connexion is to be divided with a bistoury, taking care not to wound the eye-ball. The cut surfaces are then to be kept asunder by the interposition of suitable pieces of lint, until they have healed. When the edges of the eyelids have grown together, from the outer to the inner canthus of the eye, it is of no use to separate them, if the cornea underneath is known to be perfectly opaque.

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* Ware on Fistula Lachrymalis, &c. p. 137—160.

† Saunders, op. cit. p. 15, 18, 19, and 20.

It is only in cases, in which the adhesions between the eyelids and eyeball are loose, limited to a small extent, and not situated over the cornea, that it is very practicable to do good by dividing them with a knife. Even in such instances, it is frequently very difficult to prevent the adhesions from forming again. The irritation of substances, interposed between the cut surfaces, is generally so great, that the surgeon is obliged to withdraw them. The only plan, which can then be followed, is frequently to introduce a probe between the cut surfaces, make the patient move his eyelids about, and smear the inside of them, every now and then, with a little of the unguent. saturninum, by means of a hair pencil.

ECTROPIUM.

This disease for the most part affects the lower eyelid, which becomes turned out towards the cheek, and does not apply itself to the eye-ball.* Thus the inner lining of the palpebra is turned outward, and the lower portion of the eyeball is uncovered. The consequence is, that the exposure of the eye and sensible lining of the eyelid induces in these parts a species of chronic inflammation, not only attended with a constant flux of tears and pain, but also with a preternatural redness and thickening of the lining of the affected eyelid. At length, the exposed membrane is converted into an indurated, callous substance, which lies just under the globe of the eye. It is obvious, how this disease must obstruct the flow of tears towards the inner angle, and through the puncta lachrymalia, and why the complaint should always be attended with a weeping of the eye.

One of the most common causes of this malady is a contraction of the integuments of the eyelid, or neighbouring part of the face. This change usually follows the cicatrization of burns, ulcers, and wounds.

Slight cases, arising in this manner, may sometimes be cured, by keeping the eyelid gradually raised more and more every day, with small strips of sticking plaster, which are to be applied to the outside of the affected eyelid, and to the lower part of the forehead. It must be confessed, however, that this method seldom proves permanently efficacious.

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* Plate 4, fig. 4.

In most instances, it is necessary to remove a considerable portion of the thickened exposed lining of the eyelid, with the aid of a convex bistoury, and a pair of dissecting forceps. In proportion as the wound heals afterwards, the eyelid, when properly supported by a compress and bandage, returns to its natural position. In the operation, care must be taken not to cut the puncta lachrymalia. The eyelid is drawn inward again by the same principle, which caused its eversion, viz. the contraction of the cicatrix.*

There is another species of ectropium, mostly met with in old persons, which arises from a relaxation and swelling of the conjunctiva, and from a fungous thickened state of the lining of the everted eyelid. Trivial cases of this sort may be cured by turning the eyelid completely out, and rubbing the argentum nitratum along its fungous surface, until a slough is produced, and afterwards using such remedies as will be recommended in the chapter on ophthalmy, for curing the relaxation of the conjunctiva. The eyelid must be kept everted, until the whole of the caustic has been completely washed off the slough, and the part smeared with oil.

TRICHIASIS.

In this disease, the eyelashes are turned inward toward the eyeball, which they irritate so much as to produce very serious complaints. This malady is of two descriptions; one, in which there is no defect of the eyelid, and the whole grievance depends entirely on the wrong direction, in which the eyelashes grow; in the other, the defect lies altogether in the eyelid itself, the margin of which is preternaturally turned towards the eye, so that the cilia rub against the front of this organ, and cause considerable inconvenience. The latter case, which is much the most common, is termed *entropium.*

It is observed by Mr. Saunders, that the superior palpebra, when inverted in the slightest degree, is the cause of a most vexatious irritation of the eye; but, when a large portion is inverted, the case becomes most distressing, from the violent ophthalmy, which is produced. The friction of the cilia, against the eye is incessant, and the patient's health and strength decline, through never ceasing irritation. The cornea is ulcerated, and becomes opaque, and the sight is ultimately destroyed. Nor is this the end of the patient's misery; except, as occasionally happens, the cornea becomes thickened and indurated in an extraordinary degree, assuming a white appearance, like that of a macerated ligament. If this be the case, the patient finds ease in the insensibility of this new formed substance.

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* Plate 4, fig. 5.

The appearance of the disease, in its inveterate form, is truly disagreeable. The discharge, the copious flow of tears, the excoriation of the cheek, the opacity of the cornea, the villous, granular, or fungous conjunctiva, compose altogether a disgusting sight. The patient carries his head obliquely, and attempts, in the most awkward manner, to direct the pupil towards the objects, which he wants to see. Indeed, when the upper eyelid is that, which is inverted, the patient, in order to evade turning up the eye, distorts the head, so as to seem as if he had a wry neck.*

The causes of the distorted position of the cilia are, for the most part, cicatrices, and little indurations on the edges of the eyelids. A preceding inflammation, or ulceration, has made the hairs fall off, and when they grow again, they shoot in a wrong direction. The trichiasis, if not relieved, generally destroys the eyesight; for, the friction and pressure of the hairs against the eye occasion severe pain, constant inflammation, and, at length, ulcers, and complete opacities of the cornea.

The cure of the first description of trichiasis consists in plucking out the inverted hairs, and preventing their growing again in the same direction. When many project inward, it is as well to be content with eradicating a few every day, lest the operation should create too much pain and inflammation. The prevention of the hairs growing again in the same position, is frequently very difficult.

After plucking out the hairs, the most successful plans are to smear the whole inner half of the margin of the eyelid, by means of a fine hair pencil, with the aq. ammon. pur.; or a solution of the argentum nitratum; or else to remove a piece of the skin, containing the roots of the inverted cilia, as proposed by Mr. Saunders.

The second kind of case, called entropium, is far the most frequent. In the upper eyelid, the defect is often owing to a relaxed state of the levator muscle; and then it may sometimes be cured by supporting the eyelid, for a certain time, with the aid of sticking plaster; but, if this plan fails, a cure may almost always be accomplished by cutting away, with the aid of a pair of forceps and scissars, a fold of the integuments near the edge of the tarsus. Care should be taken to do this just in the middle of the inverted part. The wound is then to be closed,* as well as circumstances will allow, with sticking plaster, compresses, and a bandage.* In proportion as the contraction of the cicatrix follows, the eyelid will be restored to its right position. This method of treatment seems particularly rational, when the entropium depends on a relaxation of the skin of the eyelid.

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* See Saunder's Treatise on Some Pract. Points, relating to Diseases of the Eye, &c. p. 45—48.

With respect to the inversion of the upper eyelid, however, Mr. Saunders believed, that, the disease was always owing to a burn, a wound, or inflammation,† and the treatment, that he has proposed, I shall presently notice.

Dr. Crampton effected a cure, in one example, by making two perpendicular incisions in the broad margin of the tarsus, at the sides of the inverted hairs, and then making a transverse cut through the lining of the eyelid, from the extremity of one of the first wounds to that of the other. The inverted portion of cartilage, within the incisions, was then put into its right position, and retained so with sticking plaster.‡ Of Dr. Crampton's operation, for the early stage of the disease, Mr. Saunders has spoken highly; but, then, this gentleman states, that, by frequent ophthalmy, attended with ulceration of the conjunctiva, and, lastly, of the tarsus itself, such a vicious bending of the latter part is caused, that every attempt at re-establishing its original position is fruitless. Hence, he maintains, its excision is decidedly indicated; an operation, that is followed by no pain, nor uneasiness, and that is sure in its effect. No particular shortening of the eyelid ensues; the deformity is vastly lessened; and, unless the cornea has been rendered too opaque, perfect vision is restored.

Mr. Saunders directs a piece of thin horn, or a plate of silver, having a curvature corresponding to that of the eyelid, to be introduced under this part, with its concavity towards the eyeball. On this instrument, the eyelid is to be stretched. An incision is to be made through the integuments and orbicularis palpebrarum, down to the tarsus, immediately behind the roots of the cilia. The cut should extend from the punctum lachrymale to the external angle. The exterior surface of the tarsus is then to be dissected, until the orbital margin is exposed, when the conjunctiva is to be cut through directly by the side of the tarsus, which must now be disengaged at each extremity. The punctum lachrymale must be left uninjured. The operation is described, as being exceedingly simple, and, if any embarrassment arises, it is from the hemorrhage of the ciliary artery, the blood sometimes obscuring the punctum lachrymale just when the operator is about to divide the tarsus by the side of it. No dressings are said to be required; and it is merely necessary to keep the eye covered for a few days. The skin will continue to be elevated, just as the perfect eyelid was; and, though less completely, sufficiently to leave the pupil clear, when the eye is moderately directed upward. A fungus grew from the wound, in all the cases, in which Mr. Saunders operated. He recommends such excrescence to be destroyed with caustic, or the knife.

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* See Scarpa's Osservaz. &c. sulle Principali Malattie degli Occhi, p. 76—78, edit. 8vo.

† Page 49.

‡ See Crampton's Essay on the Entropeon, p. 35.

Respecting this operation, I shall merely observe, that it is more severe, than that advised by Scarpa, and must leave more disfigurement. Unless, therefore, the latter method prove ineffectual, I see no reason for abandoning it.

Inversion of the lower eyelid is much less common, than that of the upper one. The late Mr. Saunders never saw this disease arise from the same causes, which induce it in the upper palpebra, though he acknowledges the possibility of such a case. However, he met with several instances of the affection, in consequence of encysted tumors, which, as they increased, carried the orbital edge of the tarsus outwards, and, in the same proportion, inclined the ciliary edge towards the globe of the eye.

An inversion of the inferior palpebra is sometimes produced by inflammation and swelling of that part of the conjunctiva, which connects the eyelid with the eyeball. In cases of ophthalmy, it often forms between the latter parts a distinct fold, which is situated just on the inside of the orbital edge of the tarsus, and pushes it outward; while the contraction of the orbicularis muscle turns inward the ciliary edge, and inclines it between the projecting tumefied conjunctiva and the eye. In an early stage, replacing the eyelid, and maintaining it so, until the ophthalmy has been lessened by proper means, will be found effectual. But, when the conjunctiva has become much thickened and indurated, Mr. Saunders recommends cutting this part of it away, and applying compresses to keep inward the orbital edge of the tarsus.*

PTOSIS.

This is an affection of the upper eyelid, which the patient cannot elevate in the natural manner. There are varieties of the complaint; the first depends on a preternatural elongation of the skin of the upper eyelid; the second, on a weakness or total paralysis of the levator muscle; and the third, on a spasmodic contraction of the orbicularis palpebrarum.

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* See Saunders's Treatise on Some Pract. Points, relating to Diseases of the Eye, &c. chap. 3.

The first kind is the most frequent, and is cured by the removal of the redundant integuments of the eyelid.

The second species is principally met with in old persons, in whom the cure is often impracticable. This sort of ptosis sometimes seems to be symptomatic of other affections, chlorosis, irritation in the stomach and bowels, worms, &c. Sometimes it is entirely a local defect.

The chief means of cure are, the external use of the tincture of cantharides and cold water; the shower bath; the internal exhibition of bark; the use of camphorated liniments; electricity. This ptosis is frequently periodical.

The third species of ptosis arises from a spasmodic affection of the orbicularis muscle, and is the most uncommon. The affection is never continual; but, makes its attacks at certain, or uncertain periods, and its duration is sometimes short, sometimes long.

The spasmodic ptosis usually depends on some sympathetic irritation in the system. The removal of this particular irritation, whatever it may be; the internal exhibition of antispasmodics; applying a blister to the temple; and bathing the eye with warm milk containing saffron, or with a decoction of poppy-heads, or cicuta, are objects to be observed in the treatment.

LAGOPHTHALMUS.—HARE-EYE.

This is a complaint, in which the eyelids cannot be shut, nor the eye covered. The inconveniences, resulting from the malady, are of various kinds. The eyes weep constantly, because the interruption of the alternate closure and opening of the eyelids hinders the tears from passing into the nose; the patient becomes blind in a very light situation, in consequence of his not being able to diminish the rays of light, which fall on the eye; and, on the same account, the sight becomes gradually very much weakened; the patient cannot sleep in a chamber, into which any light enters; and the extraneous substances in the atmosphere settling on the eyeball, cannot be washed away by the action of the eyelids, so that they occasion irritation, pain, and redness.

The cause of this complaint sometimes depends on a swelling, or protrusion of the eyeball out of the orbit. But, the defect commonly lies in the upper eyelid. Sometimes, though very seldom, it originates from a paralytic affection of the orbicularis muscle. This case requires the same kind of treatment as the second species of ptosis.

Lagophthalmus most frequently arises from a contraction of the skin of the upper eyelid, in consequence of wounds, abscesses, burns, &c. This case is to be treated on the same principles as the ectropium.

Until the complaint is permanently cured, the eye should be protected by a shade from exposure to a strong light.

HORDEOLUM, OR STYE.

The tumors of the eyelids are of various kinds. The stye is always situated at the edge of the eyelids. It is a very small, circumscribed tumor, about the size of a barleycorn. An inflamed stye is commonly extremely red and painful; and is very similar, in every respect, to a small boil, or an inflamed encysted tumor.

The cure of the inflamed stye demands the external employment of emollient applications; for, the tumor always suppurates; and the more this is promoted, the sooner is the patient freed from inconvenience. Even when the stye has already suppurated, emollients are the best applications, until the hardness has subsided. When the suppuration has terminated, a weak solution of the acetite of lead may be used to disperse the remaining redness and swelling.

The *indurated* stye, as it is called, occasions a good deal of inconvenience, by frequently inflaming, and becoming painful, hindering the motion of the eyelids, and preventing the free enjoyment of sight. The best mode of curing this disease is to touch the little induration with the argentum nitratum, until it is destroyed.

ENCYSTED TUMORS OF THE EYELIDS.

These are most frequently situated immediately under the skin; but, sometimes, they lie so deeply, that they can be taken out more easily from the inside, than the outside, of the part. They seldom become very large; and are more commonly observed on the upper, than the lower, eyelid. When they have attained a certain size, they hinder the elevation of the eyelid, and occasion a ptosis.

The attempt to disperse encysted tumors of the eyelids generally fails; and as the operation of removing them with a knife is by no means serious, it is almost absurd to tamper with the complaint. Scarpa is a strong advocate for removing the generality of these tumors, by making the incision through the lining of the eyelid. One would conceive, that, if the tumor were on the outside of the cartilage of the eyelid, the operation must be most easy, when the wound is made through the integuments of the part.

CHAP. XIII.

OPHTHALMY.

SYMPTOMS.

OF all the disorders of the eyes, inflammation is the most frequent, and there are few other diseases of these organs, on which it is not attendant. Of many, it is a necessary symptom or consequence. Pain and redness are its chief diagnostic symptoms; the latter one is particularly so, the healthy eye being free from all redness. But, this appearance is not essential to ophthalmy; for, many eyes, undergoing vehement inflammation, are little, or not at all, red. The *internal* ophthalmy is of this description. The red appearance, when present, is most evident in the white of the eye; but, when the inflammation is severe, red vessels are frequently seen ramifying over the cornea. Little vesicles, containing extravasated blood, also, sometimes form on this transparent membrane. The dark red swelling of the conjunctiva, termed chemosis, arises from an effusion of blood into the loose cellular texture, which connects this membrane with the sclerotica. The eyelids also commonly partake of the redness attendant on ophthalmy.

In mild cases, the pain may be compared with a sense of heat in the part affected, or with a sensation, seeming to arise from the lodgment of sand, or dust, underneath the eyelids. In more severe instances, there is a violent, burning, spasmodic, darting pain in the eye. When the patient feels as if the orbit were too small for the eyeball, and he experiences a darting pain in the eyebrow, sometimes shooting as far as the occiput, we may infer, that the ophthalmy is of a very vehement sort, and that there is danger of suppuration.

The exposure of an inflamed eye to the light is productive of considerable pain, attended with a copious discharge of tears;

consequently, patients, affected with ophthalmy, are generally observed with their eyes, more or less, closed.

Ophthalmy is sometimes attended with a diminution, or total loss of vision; and this unpleasant event may depend on opacity of the cornea, a closure of the pupil, or a paralytic state of the retina.

Tumefaction, which accompanies inflammation in general, seems principally to affect, in these cases, the conjunctiva forming the white of the eye. In very violent ophthalmies, this membrane swells, in such a manner, that it covers the whole cornea, protruding like a thick fold between the eyelids, which cannot be shut. The whole eyeball seems, on this occasion, like a portion of red flesh. The cornea is also liable to become considerably thickened, so as to come into contact with the iris, and adhere to it, or to form an opaque prominence, forward, termed *staphyloma.*

In ophthalmy, the eyelids are not unfrequently very much swollen. Acute inflammations of the eyes are usually accompanied with the common symptoms of inflammatory fever, the constitutional disturbance being proportioned to the vehemence of the local affection.

In severe ophthalmy, two distinct stages are in general observable; the first is attended with a great deal of heat and pain in the eye, and considerable febrile disorder; the second is, comparatively, a chronic affection, without pain and fever. The eye is merely weakened, moister, than in the healthy state, and more or less red. The second stage is frequently very obstinate, and much more difficult to cure, than the first.

CAUSES.

Ophthalmy may be the consequence of the generality of such exciting causes, as operate in producing inflammation in other situations. A severe cold, in which the eyes are affected, at the same time, with the pituitary cavities, fauces, and trachea; change of weather; sudden transitions from heat to cold; the prevalence of cold winds; residing in damp, or sandy countries, in the hot season; exposure of the eyes to the vivid rays of the sun; are causes usually enumerated, and considering which, it does not seem extraordinary, that ophthalmy should often make its appearance as an epidemic, and afflict persons of every age and sex. Besides these exciting causes, writers also generally mention the suppression of some habitual discharge, as of the menses, bleedings from the nose, from hemorrhoids, &c.; worms, dentition, &c. No experienced man can entertain any doubt, that there is a most intimate sympathy between the eyes and the abdominal viscera.*

TREATMENT OF ACUTE OPHTHALMY.

In general, mild cases are easily cured by means of low diet, and gentle purging, with small repeated doses of the antim. tart. Scarpa recommends the following formula:

> ℞ Antim. tart. gr. j. Decocti hordei ℔iss. Crystall. tart. ʒj: Sacchari pur. ʒij.—M.

This mixture is to be taken, every day, in convenient doses. After searching for any extraneous body, that may have insinuated itself beneath the eyelids, the eye may be repeatedly washed with warm milk put into an eye-cup, and the affected organ may afterwards be covered with a very soft bread and milk poultice, included in a little bag of fine muslin.

Under this treatment, the acute stage of the ophthalmy commonly ceases in four or five days. The patient no longer complains of that oppressive sense of heat, weight, tension, and throbbing, experienced at first, and bears a moderate light, without such a profuse evacuation of tears as was previously produced by this cause.

At this period, how red soever the conjunctiva may appear, it is no longer affected with acute inflammation; and the ophthalmy has relapsed, from its inflammatory stage, into one comparatively chronic, attended with weakness and relaxation of the vessels of the conjunctiva, and membranous lining of the eyelids. Emollients are now improper, and astringent and corroborant collyria are indicated.

> ℞ Zinci vitriol. gr. v. Aq. rosæ ℥iv. M. Or, Cerussæ acet. gr. viij. Aq. fœniculi ℥vj. Spir. vin. camph. gtt. x.—M.

One of these lotions should be applied to the eye, four or five times a day, by means of an eye-cup.

The severe acute ophthalmy, and that which is attended with chemosis, require the antiphlogistic treatment in the most rigorous degree. Both general and topical blood-letting should be speedily put into practice, attention being paid to the age and constitution of the patient. Leeches should be applied to the vicinity of the eyelids, or, what is still better, blood should be taken from the temporal artery. When the chemosis is very considerable, the distention of the conjunctiva may be relieved, by making an incision into this membrane, near its junction with the cornea.

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* See Scarpa's Osservazioni, &c. sulle Principali Malattie degli Occhi, p. 113, 114.

When bleeding and evacuations have been put into practice, the next most useful measure is to apply a blister to the temple, or nape of the neck.

At first, emollient applications are the most beneficial, such as a bread and milk poultice, or the soft pulp of a baked apple, included in a little appropriate muslin bag. Remedies of this description should be renewed, at least, once every two hours. When the ophthalmy is accompanied with an insupportable pain in the head, a strong decoction of poppy heads may be used as a fomentation. In order to prevent the eyelids from adhering together in the night-time, their edges may be smeared with the spermaceti ointment.

Under the preceding treatment, the acute stage of violent ophthalmy commonly ceases in about a week. The burning heat, and darting pains in the eyes; the fever; and the tension of the eyelids, subside; while a discharge of thick matter succeeds a secretion of thin serum, or a preternaturally dry state of these organs. A moderate light can now be borne without vast irritation. Notwithstanding the eyes may continue red, and the conjunctiva tumefied, evacuations and emollient applications are to be abandoned. One of the abovementioned collyria is to be employed; and such patients, as cannot bear the application cold, are to be permitted to use it warm. In proportion as the irritability diminishes, the warmth of the collyrium should be lessened, until the application can be borne quite cold.

The *tinctura thebaica*, or *vinum opii*, first tried and recommended by Mr. Ware,* proves a most efficacious remedy for ophthalmy, connected with local vascular weakness. Two or three drops may be insinuated between the palpebræ and eyeball twice a day. However, in some instances, once in the evening proves sufficient. The application, at first, excites severe pain, and a copious flux of tears; but these symptoms soon go off, and leave the eye in a very improved state. When this remedy proves unsuccessful, it is usually when it has been employed prematurely, while great irritability and aversion to light exist.

Whenever the patient can easily bear a moderate degree of light, all coverings should be removed from the eye, except a shade of green silk. A brighter light should every day be admitted into his chamber, so that he may become habituated to the open day light as soon as possible. Nothing has a greater tendency to maintain and augment the morbid irritability of the eyes, than keeping them unnecessarily long in a dark situation, or covered with compresses and bandages.

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* See Remarks on Ophthalmy, &c. p. 46, et seq. edit. 3.

Mr. James Wardrop has recommended puncturing the cornea, and letting out the aqueous humour, in certain cases of ophthalmy. This gentleman states, that, in the living body, the transparency of the cornea varies according to the degree of its distention, and that, in cases of opacity of the cornea, attended with fulness of the eyeball, the transparency of the above membrane may be restored by the evacuation of the aqueous humour. Mr. Wardrop first tried the experiment in a case, in which there was a considerable degree of milkiness and opacity of the cornea, and in which the eyeball appeared distended and prominent, attended with acute inflammatory symptoms. He discharged the aqueous humour by a small incision, and found, that the operation produced, not only an alteration in the degree of the transparency of the cornea; but, an abatement of the pain, and a sudden check of all the inflammatory symptoms. Hence, Mr. Wardrop was afterwards led to perform the operation for the purpose of relieving the ophthalmy, as well as preventing opacity of the cornea, when the inflammation was attended with a fulness, prominence, and sense of distention in the eye, and cloudiness of the cornea. He says, also, that, in all cases, in which, there is the smallest quantity of pus in the anterior chamber, accompanied with inflammation, he would let out the contents of this part of the eye.

Mr. Wardrop recommends the operation to be done with such a knife, as is employed for the extraction of the cataract. The instrument is to be introduced into the cornea, so as to make an incision, as broad as the blade, at the place, where the knife is usually introduced in operating to extract the cataract. Then, the aqueous humour flows out along the edges of the blade, as soon as this is turned a little on its own axis.*

PURULENT OPHTHALMY IN ADULT SUBJECTS.

The purulent eyes of infants have already been noticed in the preceding chapter. There is another kind of purulent ophthalmy, to which adults are subject, and which is so generally represented by the best modern authors, as arising from two very peculiar causes, viz. the suppression of a gonorrhœa, and the inadvertent application of gonorrhœal matter to the eyes, that the mention of the case cannot be prudently omitted.

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* See Edinb. Med. and Surg. Journal, vol. 3, p. 56.

The disease produces rather a swelling of the conjunctiva than of the eyelids. This tumefaction is followed by a discharge of a yellow, greenish matter, similar to what issues from the urethra in cases of clap. Heat, and pain in the eyes; great aversion to light; and, in some instances, an appearance of hypopium in the anterior chamber; attend the malady. When the complaint proceeds from the second cause, it is said to be less severe.

TREATMENT.

With respect to the case alledged to originate from the suppression of a discharge from the urethra, the injection of warm oil, the introduction of a bougie into the passage, and the application of poultices to the perineum, with a view of renewing the discharge, form the outline of the practice of such surgeons, as place implicit reliance in the reality of the abovementioned cause. However, the rarity of the complaint, upon the sudden stoppage of a gonorrhœa; the possibility of an ophthalmy arising as well at this as at any other period, and quite independently of the urethral affection; and the fallacious nature of any inference, deduced from the supposed resemblance of the discharge from the eyes to that from the urethra, cannot fail to raise, in a discerning mind, a degree of doubt, concerning the assigned cause. But, should the fact be indisputably established, it would shew a most sympathetic connexion between the urethra and organs of vision; but not any metastasis.

The treatment of purulent ophthalmies, from what cause soever they may arise, consists, at first, in adopting antiphlogistic means, applying emollient remedies to the eyes, and a blister to the temple, or nape of the neck. The eyes may be frequently fomented with a decoction of white poppy heads, and warm milk may be repeatedly injected beneath the eyelids. To prevent the palpebræ from adhering together, the spermaceti cerate may be smeared upon the edge of each tarsus, every night at bed time.

When the heat, and pain in the eyes, and febrile symptoms have diminished; when an abundant discharge of pus has commenced; all topical emollient applications are to be relinquished, and a collyrium, thus composed,

℞ Aq. rosæ ℥x. Hydrarg. mur. gr. j.—M.

made use of. Scarpa affirms, that, in the ophthalmy, originating from the inadvertent communication of gonorrhœal matter to the eyes, applications in the form of ointment, such as Janin's ophthalmic ointment, or the ung. hydrarg. nitrat. are more efficacious, that fluid remedies.

CHRONIC OPHTHALMY.

We have seen, from the foregoing account, that every acute ophthalmy has a second stage, which is, when compared with the first, of a chronic nature. However, when we speak of *chronic ophthalmy*, we generally mean the disease as it appears in a very protracted state.

CAUSES.

The general causes of chronic ophthalmy are of three kinds. 1. An increased irritability continuing in the eye after acute ophthalmy. 2. Another affection of the eye and adjoining parts, of which the chronic ophthalmy is only an effect. 3. Constitutional disease.

1. The first kind of case requires the internal exhibition of bark and valerian. The patient should take nourishing, easily digestible food; a moderate quantity of wine, and gentle exercise; and he should reside in a mild and salubrious situation. The vapour of the spirit. ammon. comp. (L. P.) should be applied to the eye through a funnel for half an hour, three or four times a day, and the eyelids and eyebrow may be rubbed with the linimentum camphoræ.

2. The disorders in the eye and its vicinity, on which chronic ophthalmy depends, as an effect, cannot be considered in this chapter.

SCROFULOUS OPHTHALMY.

According to the posthumous work of Mr. Saunders, pustules of the conjunctiva, aggregated at the margin of the cornea, or appearing separately, or successively over any part of its surface, constitute a specific character of strumous ophthalmy, with which the morbid appearances, peculiar to a scrofulous constitution, are, in various degrees, connected. In large cities, the causes are stated to be an impure atmosphere, improper food, and cold.*

No specific for scrofula being known, the treatment consists rather in preventing an aggravation, than attempting the radical cure of the complaint. Every thing debilitating is injurious; as evacuations, indigestible food, intense study, a sedentary life, damp marshy residences, lowness of spirits, frequent transitions from heat to cold. On the other hand, keeping the bowels regular with small doses of kali tart.; antim. tart; or rhubarb;

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* P. 99.

and the exhibition of bark, to which may be occasionally added the tinct. guaiaci ammon., are particularly useful. The Æthiops mineralis may be advantageously given from gr. ss. to gr. xx. every day for three weeks. Scarpa also recommends the aq. calcis to be taken in broths for several months. Sea-bathing and friction of the body with a flesh-brush, are always beneficial.

With regard to topical remedies, soft relaxing applications prove hurtful; but, slightly astringent collyria, the tinct. thebaic. and the ung. tutiæ, are proper. All coverings must be removed from the eyes, except a shade of green silk.

Scrofula often disappears spontaneously, as children approach the adult state, and, with it, this affection of the eyes.

Upon the treatment of scrofulous ophthalmy, I find nothing very remarkable in Mr. Saunders's publication. Mild cases are said to yield to a purer atmosphere, and a few doses of calomel and rhubarb; but, too frequent a repetition of calomel is condemned. When the inflammation is not acute, and the ulcers are indisposed to heal, we are advised to inject on them a solution of nitrate of silver, two grains to an ounce of distilled water. But, when more lymph is effused round the ulcer, than is necessary for the healing process, general, or topical bleeding, and more frequent purging, are sanctioned. In this state, every stimulant application is forbidden, and we are recommended to employ either a very weak saturnine lotion, cold; or else a warm decoction of poppies.*

In my judgment, the practical observations of Scarpa on this subject are infinitely more valuable, than those published in Mr. Saunders's work.

CHRONIC OPHTHALMY SUCCEEDING THE SMALL POX.

This species is described as peculiarly obstinate. Setons in the nape of the neck are among the best remedies. Scarpa recommends either the following powders, or pill, for a child ten years old;

℞ Crem. tart. ʒss. Antim. tart. gr. j.—M.

This quantity is to be divided into six parts, one of which is to be taken every morning and evening.

℞ Calom. gr. j. Sulph. aur. antim. gr. j. Pulv. cicut. gr. iv. ft. pil.

When great irritability prevails, Scarpa recommends a mixture of ʒiii of vinum antim., and ʒj of the tinc. theb. to be given in doses of five or six drops, in any convenient vehicle, and aromatic spirituous vapours to be externally applied to the eye. In other cases, saturnine collyria, containing a little camphorated spirit; tinct. theb.; Janin's ophthalmic ointment, &c.

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* P. 100, 101.

VENEREAL OPHTHALMY.

In no subject do surgical writers betray less consistency, than in the present. Many have doubted the reality of syphilitic ophthalmy; others have admitted its occurrence, but left it undescribed. Scarpa says it is peculiar in not betraying manifest signs of inflammation, stealing on clandestinely, without much uneasiness. It afterwards relaxes the vessels of the conjunctiva, and lining of the eyelids, and alters the secretion of Meibomius's glands. Ulceration of the margin of the eyelids is caused, the eye-lashes fall off, and the cornea becomes opaque. In the worst stage, the malady excites an itching in the eyes, that exasperates at night, and diminishes towards the morning.

It is observed by Mr. Pearson, that, in that form of the secondary symptoms of syphilis, where the skin is the part chiefly affected, a disease, resembling the ophthalmia tarsi sometimes appears. It is not commonly attended with much redness of the tunica conjunctiva; nor is the sensibility of the eye to light remarkably increased: yet, this gentleman has seen it, in a few instances, in the form of an acute ophthalmia, resisting all the common modes of treatment, but yielding immediately to a course of mercury.

The venereal ophthalmy (says Mr. Pearson) resembles, in its appearance, those diseases of the tarsi and conjunctiva, which are derived from scrofula; and, in his belief, there are no specific characters, by which diseases of the eye, or eyelids, produced by the action of the venereal virus, can be distinguished from those, which are excited by other causes.*

In the posthumous work of Mr. Saunders, syphilitic inflammation of the iris is stated to differ from common inflammation of that part in the following circumstances: the iris is much more thickened and puckered, the texture appears more changed, the irritation on exposure to light is less, the pain is most intense at night, and red vessels are sooner seen in the substance of the iris. The pupil is not so much contracted, as in a case of simple inflammation; and, although the general appearance of disease is greater, the pain is actually less. The blindness is often total.

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* See a note, p. 187, of the transl. of Scarpa on the Eyes, by J. Briggs.

When syphilis affects the other tunics of the eye, as well as the iris, the eyeball is said to appear full, the patient is slightly incommoded by pressure on the organ, and the sensibility of the retina is impaired, and, in some instances, destroyed. In the worst stage, the pupil is represented as becoming irregular, and dilated; while the iris and cornea are in contact, and much diminished and obscured; the sclerotica is tumid and uneven on its surface; and much headach prevails.*

Mercurial frictions, together with the decoct. sarsap. and mezer., are recommended. A few drops of a collyrium, containing the hydrarg. mur. are also directed to be instilled under the eyelids every two hours. At night, the palpebræ may be smeared with Janin's ointment, or the ung. hydrarg. nitrat. Mr. Saunders appears to have cured venereal ophthalmies by exhibiting calomel very freely. In one case, he gave eight grains a day for a fortnight; and in another two grains were ordered, to be taken every five hours, with half a grain of opium. It seems, also, that the same gentleman sometimes took blood from the temporal arteries.

Violent inflammations of the eyes may terminate in a general suppuration of those organs, and render the restoration of sight totally impracticable.

CHAP. XIV.

OPACITIES OF THE CORNEA.

OPACITY of the cornea is one of the worst consequences of obstinate chronic ophthalmy. Scarpa distinguishes the superficial, and recent state of the disease, from the albugo and leucoma, which are usually accompanied with inflammation, assume a clear pearl colour, and affect the very substance of the cornea.

The nebula, or slight opacity, now to be considered, is preceded by, and attended with, chronic ophthalmy. The iris and pupil can be seen through a kind of dimness; and, of course,

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* See Saunders's Treatise on some practical points relating to Diseases of the Eye, &c., p. 64, 67, and pl. 1, fig. 2 and 3, with the explanation.

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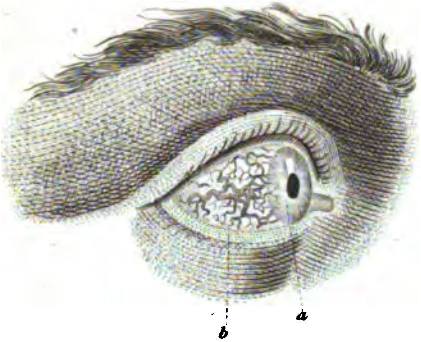

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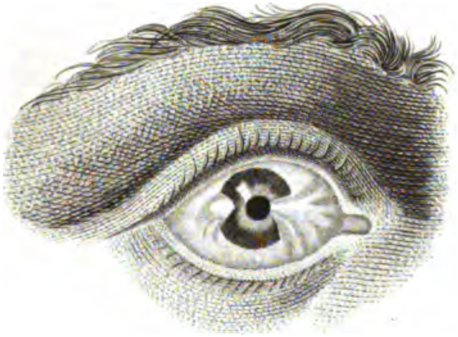

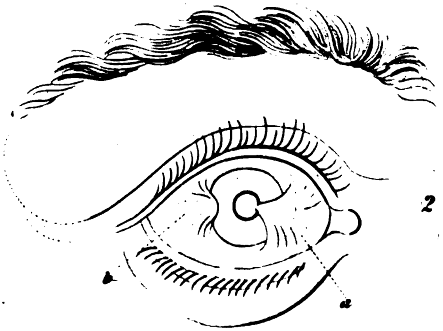

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Published April 1 1807, by R. Phillips, Bridge Street, Blackfriars London

H. Cooper

the patient is not entirely bereft of vision. The veins of the conjunctiva, greatly relaxed by the protracted duration of chronic ophthalmy, become preternaturally turgid, irregular, and knotty; first in their trunks, then in their ramifications, near the union of the cornea with the sclerotica;* and, ultimately, in their most minute branches, returning from the delicate lamina of the conjunctiva, spread over the anterior surface of the cornea. When this happens, a milky albuminous secretion begins to be superficially effused in the interspaces between the red streaks. The opaque specks, thus produced, may cover only a part, or the whole, of the cornea.

The opacity of the cornea, sometimes occurring in violent ophthalmies, is essentially different from the nebula, and arises from a deep extravasation of coagulating lymph into the cellular texture of the cornea, or from an abscess between the layers of this membrane.

TREATMENT OF THE NEBULA.

Very active measures ought to be taken in the incipient state of the disease; for, though it may at first only occupy a small portion of the cornea, if left to itself, it will continue to extend towards the centre of this membrane; and as the veins become more and more varicose, it will convert the delicate layer of the conjunctiva, spread over the surface of the cornea, into a dense, opaque film.

The curative indications are, to make the varicose vessels recover their natural diameters; and, if that be impracticable, to cut off all communication between the trunks of the most prominent varicose veins of the conjunctiva, and those on the cornea. The first plan is executed by using Janin's ointment, or the ung. hydrarg. nitrat., together with astringent collyria. The second is accomplished by the excision of the fasciculus of varicose veins, just at the base of the opacity; and, the most convenient instruments are, a very sharp pair of dissecting scissars, and the common anatomical forceps.

ALBUGO AND LEUCOMA.

These are effects of severe acute ophthalmy, and consist of an extravasation of dense lymph into the very substance of the cornea. The disease is sometimes the consequence of an ulcer, or wound of this membrane. The first species, arising from the extravasation of lymph, is named albugo; while the term leucoma is particularly applied to the other form of the complaint.

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* See Plate V. fig. 1. A, the nebula; B, dilated vessels.

The recent albugo may sometimes be dispersed by the same treatment, as is applicable to violent ophthalmy, viz. at first, general and topical bleedings, internal antiphlogistic remedies, and topical emollients; in the second stage, astringent, and moderately stimulating, topical applications. However, all our efforts are unavailing, when the action of the absorbents in the part has been, as it were, deadened, and the texture of the cornea disorganized. In recent cases, as soon as the inflammation of the eye has been subdued, there is no better remedy for promoting the absorption of the extravasated opaque matter, than the unguent. hydrarg. nitr., accurately applied to the seat of the opacity, by means of a hair-pencil. The eye may also be frequently washed with the following collyrium, mentioned in Scarpa's excellent book, on the diseases of the eyes: Two scruples of sal ammoniac, four grains of verdigrease, dissolved in eight ounces of lime water: the mixture is to stand twenty-four hours, and is then to be filtered. The treatment should be continued for three or four months, before the case is abandoned as incurable.

In the true leucoma, arising from a cicatrix, nothing known has the power of restoring the transparent state of the cornea.

CHAP. XV.

ULCERS OF THE CORNEA.

AN ulcer of the cornea is commonly the consequence of the rupture of a small abscess, which not unfrequently forms beneath the delicate layer of the conjunctiva, continued over the cornea, or in the very substance of the cornea itself, in consequence of violent ophthalmy. At other times, the ulcer is produced by the irritation of extraneous substances in contact with the eye, such as quick lime, pieces of glass, &c.

Little abscesses of the cornea ought never to be punctured, although they are slow in bursting. The matter, which they contain, is so viscid, that not a particle of it ever issues from an opening, and the wound exasperates the disease, increases the danger of the opacity of the cornea, and often occasions another small abscess in the vicinity of that, which has been punctured. The safest plan is to temporise, until the pustule spontaneously bursts; promoting this event, by means of frequent fomentations, by bathing the eye with warm milk and water, and by applying to it emollient poultices.

The ulcer of the cornea is of a pale ash-colour; its edges are high and irregular; it creates acute pain, discharges a serous matter, and has a tendency to spread widely and deeply. Scarpa has observed, that this character is not peculiar to ulcers of the cornea, it is common to all those sores, which are situated where the skin is delicate, tense, and exquisitely sensible; as on the nipples of the mammæ, the glans penis, lips, apex of the tongue, &c.

When ulcers of the cornea spread superficially, the transparency of the membrane becomes destroyed; when they proceed deeply, and penetrate the anterior chamber of the aqueous humour, this fluid escapes, and a fistulous opening may remain, or a prolapsus of a portion of the iris take place. If the ulcer is large, even the crystalline lens and vitreous humour may fall out; and, in short, a total destruction of the whole organ of sight be the result. The cicatrix of a large ulcer impairs the texture of the cornea so much, that the injury is irremediable.

TREATMENT OF ULCERS OF THE CORNEA.

In order to determine, what plan of cure should be followed it is highly important to know, that, although the ulcer is first caused by ophthalmy, this is afterwards, in its turn, kept up by the ulcer, and not the ulcer by the inflammation.

Just when the ulcer is making its appearance, while the inflammation is very violent, no doubt, the first indication is to lessen the latter, before attempting to heal the former; but, after this first stage, the grand object to be immediately attempted, is to destroy the extreme sensibility and irritability of the ulcer. In proportion as this intention is fulfilled, the ophthalmy gradually vanishes, or, at most, only requires the use of an astringent collyrium.

The best plan is to take a piece of the argentum nitratum, scraped to a point, like a pencil, and to apply it accurately to the ulcerated surface of the cornea, until an eschar is formed. The eye is to be immediately afterwards bathed with warm milk. At the instant, when the caustic is applied, the patient complains of a most acute pain; but, he is amply compensated for this temporary suffering, by the comfort experienced, a very few minutes after the operation.

The production of ease, in so sudden a manner, is entirely owing to the destruction of the irritable surface of the ulcer, and to the eschar, which shields the part affected from the contact of the neighbouring surfaces; but the relief only lasts until the slough is detached. On the recurrence of burning pain at the ulcerated part, and of restraint in moving the eye and eyelids, the surgeon, without delay, is to renew the application of the argentum nitratum, taking care to make as good an eschar as before, over the whole surface of the sore. The same benefit, experienced from the previous operation, will be experienced again. In this manner, the caustic is to be used as often as it may be necessary. At every separation of the eschar, the diseased sensibility of the eye, and the extent and depth of the ulcer, will be found more and more diminished. The sore also loses its ash-colour, and assumes a pink hue: a certain mark of its disposition to heal. We must now abandon the use of the caustic, and be content with employing the vitriolic collyrium. Towards the end of the case, if relaxation of the cornea should continue, Janin's ointment may be serviceable.

Slight excoriations of the cornea, being mere separations of the layer of the conjunctiva, naturally spread over that membrane, do not require the use of caustic: for them the vitriolic collyrium is quite sufficient.

Sometimes, as Scarpa accurately describes, the ulcer of the cornea, being already very extensive, and wrongly treated, assumes the form of a fungous excrescence, which seems to derive its support from a plexus of blood-vessels in the conjunctiva. This sort of ulcer, left to itself, or treated with slight astringents, produces, in general, a loss of sight. The most vigorous measures are indicated. These consist in cutting away the fungus with a pair of small scissars, to a level with the cornea, and continuing the incision far enough on the conjunctiva to remove, with the excrescence, the net-work of vessels, from which it was supplied with blood. Having accomplished this, and allowed the blood to flow freely, the argentum nitratum is to be applied to all that surface of the cornea, which appears to have been the seat of the fungus. The application of the caustic must be repeated, until the ulcerative process changes into the healing one,

CHAP XVI.

OF THE PTERYGIUM AND ENCANTHIS.

1. PTERYGIUM.

THIS term is applied to a little, preternatural, reddish, ash-coloured, triangular membrane, usually growing from the internal angle of the eye, about the caruncula lachrymalis, and extending over the cornea to the great impairment of vision. Although this kind of membrane generally proceeds from the inner canthus, it occasionally arises from the outer one, and, in some instances, from the superior and inferior hemisphere of the eye itself. Wheresoever it originates, it is a remarkable fact, that it is invariably of a triangular shape, the base of the triangle being towards the white of the eye, the apex towards the cornea, sometimes at a greater, sometimes at a lesser distance, from the axis of sight. In a few uncommon cases, two* or three pterygia, of various sizes, are met with in the same eye, arranged with different interspaces around the circumference of the organ. Sometimes, their points meet, and coalesce on the centre of the cornea, so as completely to abolish the functions of the eye.

Scarpa observes, with his usual accuracy, that between chronic varicose ophthalmy with relaxation of the conjunctiva, the superficial opacity, termed nebula, and the pterygium, the only difference is in the degree of the disease. All three consist of a varicose state of the vessels of the conjunctiva, over a certain extent of this membrane, together with a degree of relaxation of the tunic itself. In the chronic varicose ophthalmy, the preternatural magnitude, and knottiness of the veins, and the relaxation of the conjunctiva, are confined to the white of the eye; in the nebula, the vessels of the conjunctiva are dilated and knotty, even over some part of the delicate layer of this membrane, covering the transparent portion of the eye: in the pterygium, to the varicose state of the vessels on the surface of the cornea, is added a thickening of the lamina of the conjunctiva, spread over this membrane.

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* Plate V. fig. 2. Two pterygia, of different sizes, on the same eye. A, the larger one, next the nose; B, the smaller one, next the temple. The straight and semicircular lines on the pterygium, A, denote the double direction, which ought to be given to the incision, in extirpating the malady.

A very peculiar feature of the pterygium, is the facility, with which it may be taken hold of with a pair of forceps, and raised in a fold over the cornea. It is worthy of notice, however, that sometimes the pterygium assumes a malignant cancerous nature, and then it has a bright red colour, like sealing-wax, easily bleeds when touched, is firmly adherent to the cornea, and occasions lancinating pains, which extend over the whole eye and temple. Scarpa recommends this case to be treated on the palliative plan; but, it seems questionable, whether it might not be proper to attempt the total excision of the malady; if the trial should fail, we might then extirpate the eye; an operation truly horrible; but, one, which would certainly become inevitable, if the malignant pterygium were allowed to increase, and one, which can be avoided by no other means, than an effort to extirpate the recent disease.

TREATMENT OF THE PTERYGIUM.

The cure is performed by accurately cutting away the opaque triangular membrane from the surface of the cornea. As the pterygium itself is the delicate layer of the conjunctiva, forming the natural covering of the cornea, a cicatrix, and a degree of dimness, necessarily remain after the operation. The opacity, however, is always of much less extent, than the pterygium.

A pair of small dissecting forceps, and a pair of very sharp scissars, suffice for the operation. Scarpa has found it unnecessary to detach every pterygium, from its point to the termination of its basis; but, only to continue the detachment from its point, as far as the commencement of the sclerotica, and then to complete its separation from the eye by a semilunar transverse incision,* comprehending a portion of the conjunctiva one line in breadth. The subsequent part of the treatment chiefly consists in preventing inflammation.

2. ENCANTHIS.

The encanthis, in the incipient state, is a small, soft, red, and sometimes livid excrescence, growing from the caruncula lachrymalis, and neighbouring semilunar fold of the conjunctiva. In the inveterate state, its magnitude is considerable, and its roots extend beyond the caruncula lachrymalis, along the lining of one or both eyelids. The complaint excites chronic ophthalmy, prevents the complete closure of the eye, and by compressing and displacing the puncta lachrymalia, obstructs the free passage of tears into the nose. The surface of the excrescence is at first granulated like a mulberry; but, after the tumor has become large, only a part of its outside has the above appearance, while the rest seems like a smooth, whitish, ash-coloured substance. In this advanced state, the body of the encanthis divides (to use Scarpa's figurative expression) like a swallow's tail, so as to form two elongations, one of which extends along the inner surface of the upper eyelid, the other along the inside of the lower one.

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* See the shape of the incision, Plate 5, fig. 2.

As of pterygium, so there is a malignant species of encanthis, denoted by its dull red colour, bleeding tendency, lancinating pain, excessive hardness, and very fetid discharge. The same practical observations apply to this case, as to the cancerous pterygium.

TREATMENT OF THE ENCANTHIS.

The cure of this disease is accomplished by raising the tumor from its base, and lifting up the elongation, extending along the inside of the eyelids with a pair of forceps, and detaching them with a pair of sharp scissars, or a bistoury.

No more of the caruncula lachrymalis is to be removed, than is absolutely essential to the success of the operation, as the deficiency would be likely to occasion an irremediable weeping of the eye.

CHAP. XVII.

STAPHYLOMA.

STAPHYLOMA

IS the name given to that disease of the eye, in which the cornea loses its natural transparency, rises above its proper level, and even projects between the eyelids, in the form of a whitish, pearl-coloured tumor, which is attended with total loss of sight.

The malady commonly results from some violent species of ophthalmy, particularly that, which is termed *purulent*, and affects children, and that, which is consequent to the small-pox. As Scarpa observes, the staphyloma is one of the most serious diseases, to which the eyeball is subject; for, to the total and irremediable loss of sight, are added all the evils, which necessarily result from the protuberance of the cornea in advanced cases. The inability of closing the eyelids; the exposure of the eyeball to the contact of the air, and extraneous matter suspended in it; the friction of the eyelashes against the tumor; the incessant flux of tears down the subjacent cheek; render the eye painful and inflamed; sympathetically induee ophthalmy in the sound one; and cause ulceration, both on the diseased part of the eye, and on the lower eyelid and cheek.

TREATMENT OF STAPHYLOMA.

The opacity being irremediable, the only surgical object is to prevent the inconveniences arising from the protuberance of the diseased cornea. In recent cases, when the tumor does not project forward, it is best to do nothing. In inveterate cases, the prominent part of the cornea must be cut off. Scarpa recommends doing the operation as far from the conjunctiva as the case will allow. This eminent practitioner introduces a knife, like that used in extraction of the cataract, completely across the staphyloma, at the distance of one line and a half, or two lines, from the centre of the tumor.

The lower half of the prominence is to be detached by pushing the knife onward, till its edge comes out through the membrane below; then the flap is to be turned up with a pair of forceps, and the incision rendered completely circular with the same bistoury. The aqueous humour, crystalline lens, and some of the vitreous humour, usually escape immediately after the operation, and the eye consequently becomes so diminished as to allow the eyelids to be shut. Ophthalmy and suppuration succeed. Emollient poultices are to be applied, until the violence of the inflammation has abated, the quantity of matter diminished, and the wound betrayed a disposition to heal. Then they may be left off, and occasionally touching the sore with the argentum nitratum, and applying a pledget over the eye, will complete the cicatrization.

Mr. Ware thinks the portion of diseased cornea, taken away in the foregoing manner, is too diminutive to allow the crystalline lens to escape without bruising the iris, and that it sometimes does not prevent the eye from becoming again distended with an aqueous fluid; he has, therefore, advised the circular incision of the cornea to be made about a quarter of an inch from the junction of that membrane with the sclerotica.*

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* Transactions of the Medical Society of London, vol. 1, art. 6.

CHAP. XVIII.

PROLAPSUS OF THE IRIS.*

SOMETIMES, when the aqueous humour has escaped through an ulcer, or wound of the cornea, the iris is pressed forward by the humours situated behind it, until a portion of it protrudes from the eye, at the same opening, through which the aqueous humour made its escape. The little tumor is of the same colour as the iris, viz. brown, or greyish, and is surrounded, at its base, by an opaque circle of the cornea.

If we reflect a little on the delicate structure of the iris, on the great quantity of blood-vessels, which enter it, and the numerous nervous filaments, which are distributed to it, we shall easily conceive the nature and severity of those symptoms, which are wont to attend this disease, how small soever the portion of the iris projecting from the cornea may be, even though not larger than a pin's head. Pain, similar to what would arise from something pricking the eye; an oppressive sense of tightness in the whole eyeball; inflammation of the conjunctiva and eyelids; a copious effusion of tears; and an absolute inability to endure the light; are the symptoms, which successively follow this complaint. The pupil deviates from the centre of the iris, towards the seat of the prolapsus, and assumes an oval shape. In very old cases, the protruded portion of the iris seems frequently to become less sensible and iritable, so that the patients do not experience inconvenience equal to that just now related.

TREATMENT OF PROLAPSUS OF THE IRIS.

In the early stage of this disease, some recommend endeavouring to replace the iris in its proper situation, by means of a small probe, and, in case of difficulty, to dilate the opening in the cornea, by an incision, just as we are accustomed to do, in order to return a strangulated hernia. Others advise suddenly exposing the eye to a strong light, with a view of making the iris contract with sufficient force to disengage the protruded portion. Scarpa condemns every attempt of this sort, and maintains that, in this disease, the total loss of sight is prevented by the aqueous humour being kept from continually escaping, in consequence of the protruded part of the iris acting like a plug, and stopping up the aperture in the cornea. However, I think, no one can question the propriety of endeavouring to replace the iris, when it is recently protruded through a wound of the cornea. But, when the prolapsus has existed some time, we ought probably to be content with accomplishing two objects; one is to diminish, as speedily as possible, the exquisite sensibility of the protruded portion of the iris; the other is to destroy gradually the projecting part of this membrane, sufficiently to prevent the little tumor from keeping the edges of the wound, or ulcer of the cornea, so much asunder as to impede cicatrization.

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* This is named by Wenzel, &c. *staphyloma.*

For this purpose, the projecting portion of the iris is to be touched with the argentum nitratum, so as to form an eschar. The patient experiences acute pain during the operation; but, it soon subsides, when the eye has been bathed with warm milk. The consequent relief only lasts while the eschar remains adherent, and when this is detached two or three days afterwards, the abovementioned complaints are experienced again, though in a milder degree. The caustic is now to be once more applied, and even used, if necessary, a third and fourth time, until the prominent part of the iris is sufficiently reduced to a level with the edges of the wound, or ulcer of the cornea, to create no obstacle to cicatrization. Then the surgeon is to be content with directing a vitriolic collyrium to be used, and the ung. hydrarg. nitrat. (lowered) to be smeared over the inner surface of the eyelids, every morning and evening.

Some recommend the projection of the iris to be cut off with a stroke of the scissars; but, this method is deemed less successful, than the plan already explained.

The shape of the pupil always remains somewhat oval. However, this is productive of a very trivial impairment of the sight, and, in time, the opening in the iris becomes much wider, than it is immediately after the cure.

CHAP. XIX.

INFLAMMATION OF THE IRIS.

IT was observed by the late Mr. Saunders, that scarcely any disease, to which the eye is subject, has a more immediate, or rapid tendency to destroy vision, than inflammation of the iris. As soon as this delicate and irritable substance is attacked with inflammation, the brilliancy of its colour fades, it becomes thickened and puckered, the inner margin is turned towards the crystalline lens, and the pupil is exceedingly contracted. The vascularity of the sclerotica is very great, whilst that of the conjunctiva remains much as usual, the plexus of vessels lying within the latter tunic. The inosculations of these vessels are very numerous, and form a species of zone at the junction of the sclerotica and cornea. Here the vessels disappear; not being continued over the transparent cornea, as in a case of simple ophthalmy; but, penetrating the sclerotica, in order to pass to the inflamed iris. The irritation, caused by the light, is distressing; and the patient is much incommoded by any pressure on the globe of the eye, or by the rapid or sudden motions of this organ. Considerable uneasiness is felt over the eyebrow, and acute lancinating pains shoot through the orbit towards the brain. Occasionally, when the inflammation is violent, and extends to the other tunics, the eye is totally destroyed by suppuration; but, the disease rarely advances to this extreme, and generally terminates in the adhesive stage. Lymph is then deposited on the anterior surface of the iris, and between the iris and the capsule of the crystalline lens; and often in so large a quantity, as to extend through the pupil, and drop pendulously to the bottom of the anterior chamber. If this process is not interrupted, the pupil is entirely obliterated; or, the iris adheres to the capsule of the lens, leaving only a very minute aperture, which is most commonly occupied by an opaque portion of the capsule, or of organized lymph, and the patient is totally blind.*

TREATMENT.

The modes of affording relief, in cases of obliteration of the pupil, will form the subject of the following chapter. Here the best method of treating inflammation of the iris, and of preventing the closure of the pupil, is the object of consideration.

In the early stage of the case, before lymph is effused, Mr. Saunders advises the most vigorous means to be adopted. Leeches, mild laxatives, and a simple regimen, will be inadequate. In an adult, when no contraindication exists, from sixteen to thirty-two ounces of blood should be taken away in the course of twenty-four hours, the quantity, however, being regulated by the judgment of the practitioner. Mr. Saunders used generally to take the blood from the temporal artery; though he thought it immaterial, whence the blood was drawn, provided enough were taken away to lower the pulse, and reduce the force of the circulation. Cathartics are to be exhibited, and, after them, moderate doses of tartarized antimony, in order to enfeeble the pulse.

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* See a treatise on some practical points relating to Diseases of the Eye, &c. by J. C. Saunders, p. 21—23.

When general bleeding has been carried, as far as the practitioner dares to push such treatment, or when the state of the constitution will bear it no more, leeches are to be applied near the eye, and their application repeated at short intervals. Should the inflammation stop at this stage, the cure may be completed by covering the eye with a weak solution of cerussa acetata, and keeping the patient, for some time, in a darkened room.

In most instances, however, the disease advances to the adhesive stage; the iris and capsule of the lens become adherent to each other; and a remarkable contraction of the pupil prevails. According to Mr. Saunders, the indication is now to effect, as much as possible, the dilatation of the pupil, so that, when the iris is fixed to the capsule of the lens, there may remain a sufficient aperture for the transmission of the rays of light to the retina. The larger this opening the better, as the pupil is generally rendered more or less opaque by the effused lymph. For this purpose, Mr. Saunders represents the application of the extract of belladonna to the conjunctiva to be a specific, as it excites a strong contraction of the radiated fibres of the iris. Its influence, indeed, is stated to be so great, that, in the utmost dilatation of the pupil, attended with perfect insensibility of the retina, Mr. Saunders invariably found it capable of causing a still greater dilatation of that opening. This gentleman used commonly to apply the extract three times a day, until the pupil had been widened as much as possible; and, in the mean time, doses of calomel and purgative medicines were exhibited, with a view of promoting the absorption of the opaque lymph. Sometimes the eyelids and eyebrow were smeared with the extract; sometimes this preparation was thinned with water to the consistence of cream, and a few drops of it instilled into the eye, just as is done with the vinum opii. In many cases, irregularity of the pupil remained; but, the patients obtained an useful degree of vision.

Though Mr. Saunders has described the inflammation, as uncombined with superficial ophthalmy, he confesses, that, generally, the conjunctiva is more or less inflamed, and, he states, that the same affection of the iris sometimes arises from syphilis, in which event, the use of mercury is necessary with that of belladonna.

CHAP. XX.

CLOSURE OF THE PUPIL.

WHEN this occurs, it is most frequently the consequence of a violent inflammation of the internal membranes of the eye, especially, the iris, in consequence of an operation. In particular instances, the malady follows the extraction and depression of the cataract; but, without an inflammatory affection of the interior of the eye appearing to have any share in its origin. After an indeterminate time from the operation, the pupil is perceived to diminish in diameter daily, without any evident cause, and ordinarily closes so much, that it can hardly admit a pin's head. The iris is motionless, and assumes a radiated rugose appearance. When no opacity exists behind this membrane, a little black speck is seen in its centre.

When the retina is sound, the patient may sometimes regain a considerable power of vision, by having an artificial pupil formed.

Cheselden was the first, who performed an operation, with a view of diminishing the blindness produced by this malady; he introduced a couching needle, having a sharp edge only on one side, through the sclerotica, about a line and a half from the margin of the cornea. After perforating the iris, towards the external angle, and then pushing the point of the needle transversely through the anterior chamber, as far as the edge of the iris next the nose, he turned the edge of the instrument backward, and withdrew it, so as to make a transverse division of the iris.

Janin practised this method in two instances; but, without success, as the edges of the opening, after a time, united;* and Sharp also experienced a failure from the same cause.† Janin found, that the best plan, was that of opening the cornea, as is done in the extraction of the cataract, and then dividing the iris with the scissars, from below upwards, near the pupil, on the side next the nose.

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* Mémoires sur l'Oeil, p. 182, 183.

† Operations of Surgery, chap. 29.

This mode seems liable to the very objection, which Janin urged against the transverse division of the iris, namely, that of sometimes failing, in consequence of the tendency in the opening to close again.

Hence, Baron Wenzel practised the excision of a portion of the iris. He introduced the point of the cornea knife into the anterior chamber, exactly in the same manner, as in the extraction of the cataract; but, when it had arrived nearly as far as the centre of the iris, it was plunged into this membrane, and then, by a slight motion of the hand backward, it was brought out again, about the distance of three quarters of a line from the part, in which it entered. Next, the incision being continued as in cases of cataract, the section of the iris will be completed, before that of the cornea, and will present a small flap, which is to be cut off with a pair of scissars.* Mr. Ware, I think, with much reason, recommends the opening to be made at least ⅛ of an inch in width, as this size does not exceed that of the natural pupil, and the operator will then be better able to extract the crystalline lens, if diseased.

Scarpa thinks, that the artificial pupil is most easily made, by detaching a certain extent of the circumference of the iris, next the nose, from the ciliary ligament, by means of a couching needle. Others object, that this mode is not only difficult; but, that the aperture is hardly ever permanent.

Mr. Gibson recommends making a puncture in the cornea, with a broad cornea knife, within a line of the sclerotica, to the extent of about three lines. All pressure is now to be removed from the eyeball, and the cornea knife gently withdrawn. The consequence of this is, that a portion of the aqueous humour escapes, and the iris falls into contact with the opening, in the cornea, and closes it like a valve. A slight pressure must now be made upon the upper and inner part of the eyeball, and be gently increased, or varied in direction, till the iris gradually protrudes, so as to present a bag of the size of a large pin's head. This protruded portion must be cut off with a pair of fine curved scissars, and all pressure at the same time removed. The iris will then recede within the eye, and the piece, that has been removed, will leave an artificial pupil more or less circular.†

When the centre of the cornea is so opaque, that the rays of light cannot enter the natural pupil, and the circumference of that membrane is transparent, vision may be materially improved by removing a portion of the iris opposite the undiseased part of the cornea.

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* Wenzel on the Cataract, p. 270—272.

† Gibson's Pract. Obs. on the Formation of an Artificial Pupil.

As far as I am capable of judging, Mr. Gibson's operation is neater and safer, than any of the others, which have been invented.

CHAP. XXI.

HYPOPIUM, OR ABSCESS IN THE ANTERIOR, OR POSTERIOR CHAMBER OF THE EYE.

Hypopium is an accumulation of a glutinous, yellowish fluid, like pus, in the anterior chamber of the aqueous humour, and frequently also in the posterior one, in consequence of violent ophthalmy.

The symptoms, exciting apprehension of an hypopium, are the very same, which occur in the highest stage of violent acute ophthalmy, viz. prodigious tumefaction of the eyelids; redness and swelling of the conjunctiva, as in chemosis; burning heat and pain in the eye; pains in the eyebrow and nape of the neck; fever; restlessness; aversion to the faintest light, and a contracted state of the pupil.

As soon as the hypopium begins to form, a yellowish, semilunar streak makes its appearance at the bottom of the anterior chamber, and regularly as the glutinous fluid is secreted, it increases in all dimensions, and gradually obscures the iris, first, its inferior part, next where it forms the pupil, and lastly, its whole circumference. While the inflammatory stage of the violent ophthalmy lasts, the hypopium never fails to enlarge; and as soon as this stage ceases, and the ophthalmy becomes connected with local weakness, the hypopium leaves off increasing, and from that moment is disposed to diminish.

TREATMENT.

During the first stage of the violent ophthalmy, while the hypopium is increasing, the same treatment, as is recommended for severe acute inflammation of the eye, is the most proper. In the second stage of the ophthalmy, when the hypopium has become stationary, surgeons, little versed in the treatment of diseases of the eyes, would suppose, that an opening ought to be made in the most depending part of the cornea. But, experience proves, that dividing this membrane, in cases of hypopium, is seldom successful, and most frequently gives rise to evils, worse than the hypopium itself, viz. the reproduction of violent ophthalmy; a greater effusion of matter into the chambers of the aqueous humour; and an ulcer of the cornea, attended with prolapsus of the iris. Scarpa only admits the propriety of making an opening in one particular case, which is, when the quantity of extravasated matter is so considerable, that the excessive distention, which it produces of all the coats of the eye, occasions such vehement symptoms, as not only threaten the entire destruction of the organ, but even endanger life.

From knowing, that blood extravasated in the eye in consequence of blows, that the fragments of membranous cataracts, that milky and caseous cataracts, nay, that the firm crystalline lens itself can be totally removed by the lymphatics, we may easily conclude, that, the resolution of an hypopium, by means of absorption, is the primary indication, to which the surgeon should direct his attention. After subduing the violence of the ophthalmy by the most rigorous employment of the antiphlogistic treatment, the surgeon must endeavour to quicken the action of the absorbents in the eye. Camphorated emollient poultices may be applied; the vapours of the spir. ammon. comp. may be directed against the eye, through a tube, two or three times a day; a blister may be put on the nape of the neck; and when the irritability of the organ has diminished, the vitriolic collyrium may be used. This may be afterwards strengthened by the addition of a few drops of camphorated spirit. Under such treatment, the hypopium most commonly disappears, in proportion as the chronic ophthalmy is relieved.

But, success does not invariably follow the most skilful treatment, and sometimes nothing can prevent ulceration, opacity, and bursting of the cornea, and a succeeding prolapsus of the iris.

In the chapter on ophthalmy, I have taken notice of Mr. Wardrop's plan of puncturing the cornea, under certain circumstances. This gentleman seems to entertain a very opposite sentiment to that professed by Scarpa; for, he says, he would perform this operation in every case of inflammation of the eye, attended with the least appearance of hypopium.

CHAP. XXII.

DROPSY OF THE EYE.

WHEN the secerning extremities of the arteries, and the minute mouths of the absorbent vessels of the eye do not act in their naturally reciprocal manner, the organ may become distended with a morbid redundance of an aqueous secretion. This malady constitutes, what is termed, dropsy of the eye, and is at first attended with great weakness, and afterwards with total loss of sight.

Scarpa, who has had many opportunities of dissecting dropsical eyes, is inclined to believe, that, in the generality of instances, the disease chiefly depends on a diseased secretion of the vitreous humour, and also occasionally, on a morbid alteration of the alveolary membrane, by which this humour is produced. The eye affected assumes an oval shape, terminating in a point on the cornea; then, as the organ enlarges in all dimensions, it projects from the orbit in such a manner, that it causes immense deformity, and prevents the closure of the eyelids.

The disease is sometimes preceded by blows on the eye, or adjoining temple; sometimes, by an obstinate internal ophthalmy. In other instances, it is preceded by no inconveniences, except an uneasy sensation of tumefaction and tension in the orbit, a difficulty of moving the eyeball, and a considerable impairment of sight. When the eye has assumed an oval figure, and the anterior chamber has become preternaturally capacious, the iris seems situated backward, in an unnatural degree, and tremulates in a very singular way, on the slightest motion of the eyeball. The pupil remains dilated in every degree of light, while the crystalline is sometimes discoloured from the very beginning of the disease, and sometimes does not become opaque, till the affection has arrived at its highest pitch. While the eye is not considerably enlarged, and the crystalline is not deeply opaque, the patient can usually distinguish the outlines of objects and brilliant colours. But, when the eye has acquired a larger volume, and the whole crystalline has become opaque, the retina becomes completely paralytic, probably, from the excessive distention, which it suffers.

In the last stage of the disease, when the dropsical eye projects from the orbit, so as not to admit of being covered by the eyelids, to the inconveniences already enumerated, others associate themselves, arising from the dryness of the eye; the contact of extraneous bodies; the friction of the eyelashes; the very viscid secretion from the eyelids; the ulceration of the lower eyelid, and even of the eye itself. Hence, the advanced stage of dropsy of the eye induces violent ophthalmies, followed by ulceration and a total destruction of the organ. The disease may even increase, in such a degree, as to prove fatal.* In cases of this aggravated description, the bones of the orbit are generally carious.

TREATMENT.

In the incipient period of the disease, it is usual to prescribe mercurials, or cicuta internally, and to make a seton in the nape of the neck. Scarpa describes astringent applications as hurtful, and recommends the eye to be bathed with a decoction of mallows.

When the disease has attained such a pitch, that the eye protrudes from the orbit, there is no means of opposing the grievous dangers now impending, except making an incision, in order to evacuate the superabundant fluid in the eye. To defer the operation any longer is the same thing as abandoning the patient to the inconvenience of an habitual ophthalmy, the danger of ulceration of the eyeball, and lower eyelid, and, what is worse, of carcinoma of the whole eye. Simply puncturing the eye is no more adequate to produce a permanent cure of the dropsical affection, than puncturing the tunica vaginalis is sufficient to produce a radical cure of the hydrocele. Inflammation and suppuration must be excited, besides discharging the redundant humours contained in the organ.

The best method to pursue is that, which has been recommended for the cure of the inveterate staphyloma. A portion of the centre of the cornea, about as broad as a pea, is to be cut out, and so much of the humours is then to be pressed out as will permit the eyelids to be brought over the eye. Nothing but a pledget of dry lint, kept on by a bandage, is to be applied, before the inflammation has taken place, which is usually about the third or fifth day. Then antiphlogistic means may be adopted, and emollients employed.

After operating for the relief of the present affliction, a fungus occasionally grows out of the internal part of the eye. Such an excrescence was, in one instance, destroyed by the external employment of belladonna.† But, in case this, or other means fail in preventing the reproduction of the fungus, it is the duty of the surgeon to recommend the entire extirpation of the diseased organ.

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* Louis, in Mém. de l'Acad. de Chirurgie, tom. 18, p. 282, edit. 12mo. and Terras, in Journ. de Médécine, tom. 45.

† Terras, Journal de Médécine, tom. 45.

In cases of hydrophthalmia, Mr. Ford proposed the introduction of a seton through the eye, for the purpose of lessening the size of the organ.*

CHAP. XXIII.

CANCER AND EXTIRPATION OF THE EYE.

CARCINOMA is said to make its appearance in this situation in three forms. Sometimes the eyeball becomes irregular and knobby, and swells to the size of an apple; the sight is gradually lost; the blood-vessels in the white of the eye enlarge; and the whole external and internal structure of the organ becomes so altered, that the part resembles a piece of flesh, and no vestiges of its original organization remain. Sometimes a portion of the cornea is still externally visible. Occasionally, a small aperture is internally discernible, through which may be distinguished the remains of the vitreous humour, and of the choroid coat. In some instances, the eyeball is ulcerated, and emits a fetid discharge. In others, there is not the smallest appearance of ulceration, and the eyeball resembles a piece of firm flesh. The patient commonly experiences in the eye, from the first, considerable burning, and, at last, violent darting pains, extending over one side of the head. This is the most frequent description of cancer of the eye.

Sometimes, excrescences form on the anterior surface of the eye, especially, on the transparent cornea, and frequently admit of being radically cured by the knife, caustic, or ligature. But, occasionally, they regularly grow again after the employment of these means, becoming broader, more malignant, and even cancerous, and, at length, changing into a spongy fungus, which is very painful, covers the whole anterior surface of the eye, and renders extirpation indispensable. This is the second sort of cancer of the eye.

On several occasions, ulcers form on the front of the eyeball, which, though generally curable by proper means, sometimes are exceedingly inveterate, entirely destroying the eyesight, and becoming so malignant as to obtain the appellation of cancer. This is the third species of cancer of this organ.*

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* See Medical Communications, vol. 1.

We here see a variety of diseases described under the common name of cancer, though, in all probability, they are not at all analogous either to each other, or to the carcinoma of any other part of the body.

Until lately, also, fungus hæmatodes of the eye has generally been confounded with cancerous affections: this disease I shall consider in the ensuing chapter.

EXTIRPATION OF THE EYE.

It becomes indispensably necessary to remove the eyeball in several kinds of cases; as, for instance, when the organ protrudes from the orbit, cannot be reduced, and the disease creates both great irritation and great disfigurement. The operation is also requisite for some ulcerated staphylomas, and for every sort of case, in which the coats and humours of the eye are so diseased, as not to admit of being restored to a natural state, and in which the distemper, if unextirpated, would be likely to end fatally, either by extending its ravages to the orbit and adjacent portion of brain, or by keeping up such pain and irritation, as must first debilitate the constitution, and ultimately destroy life.

Cancer and fungus hæmatodes of the eye, however, are the two diseases, for which the operation is most commonly required.

What is usually called a cancer of the eye does not seem to be nearly so malignant as carcinoma of the breast; for, the operation almost always accomplishes a radical cure, while the distemper is confined to the globe of the eye, and the eyelids, cellular substance, and bones of the orbit, continue unaffected. The knowledge of this circumstance should lead us to undertake the operation in good time; and we may the more readily make up our minds to perform it, since vision is always irrecoverably lost.†

In the performance of the operation, there are two important circumstances, to which attention ought to be paid. The first is to remove every particle of the disease, and leave none of the affected parts behind. The second is to avoid piercing or injuring the orbit, behind which the dura mater is immediately situated. The apprehension, indeed, of hurting the brain made Bartisch, and Fabricius Hildanus, the earliest performers of this operation, employ instruments without any sharp point. But, as a pointed scalpel may be used with safety and advantage by any man of moderate skill and care, it is properly preferred by all the best surgeons of the present day.

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* See Richter's Anfangsgrunde der Wundarzneykunst, band 3, p. 415—417.

† Richter, op. et. loc. cit.

In order to be able to separate the eyelids far enough from each other, for the easy removal of an eye that is much enlarged, it is sometimes recommended, in the first instance, to make an incision through them at their external commissure.* The patient should lie down on a table of convenient height, with his face exposed to a good light. The generality of surgical writers† advise the operator, before he begins the dissection, to introduce a strong ligature through the anterior portion of the diseased organ, by which means, the part may be drawn out, or to either side, as the convenience of the surgeon may dictate, while he is making the necessary incisions. Hooks have also been recommended for the same purpose.

Unless the eyeball be exceedingly large, the best instrument for the performance of the requisite incisions, is a common scalpel. When the diseased part is very large, there may be an advantage in employing a knife that is somewhat curved, to divide the parts deeply situated in the orbit. The famous M. Louis used a knife for the division of the conjunctiva, and completed the rest of the incisions with a pair of curved scissars.‡ Bertrandi did the same; but they have only been imitated by a few of the eminent operators, who have succeeded them; and it may therefore be concluded, that the first instrument answers very well for every part of the operation.* The upper eyelid being raised as far as possible by an assistant, and the lower one depressed by the surgeon himself, the conjunctiva, connecting the eye with the two eyelids, is first to be divided. Then the muscles and cellular substance are to be cut on all sides of the diseased organ, which, with the ligature, hook, or fingers, must be drawn in that direction, which will give most room in the place, where the operator is cutting.

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* Richter and Desault are advocates for this practice, which will generally be found materially to facilitate the rest of the operation. See Anfansgr. der Wundarzneykunst, band. 3, p. 418, and Œuvres Chir. de Desault, tom. 2. Sometimes, however, this proceeding is not necessary; because the eyeball is not very large; or because the diseased organ may be lessened by a puncture, when it contains fluid. Bertrandi observes, "Quelquefois le volume de la tumeur est si considérable, que, faisant autour des paupières comme un ceinture très-étroite, il paroît qu'on ne la peut pas extirper sans faire une dilatation à leur commissure externe, qu'on doit cependant éviter, quand cela est possible. Croyant dans un cas pareil, à cause d'un gonflement que je sentois à un des angles d'un œil fongueux, qu'il y avoit de l'humeur épanchée dans l'oeil, je le percai; il sortit la valeur d'une cuillerée de cette humeur; l'excroissance diminua de volume, et j'eus la facilité de faire pénétrer l'aiguille par derrière, et d'emporter l'œil, sans endommager les paupières." See Traité des Operations de Chirurgie, p. 520, Paris edit. 1784.

† See Bertrandi, Opere cit. 519; Ware, in Trans. of the Medical Society of London, vol. 1, p. 149.

‡ See Mém. de l'Acad. de Chir. tom. 13, p. 329, edit. 12mo.

As when the eyeball is enlarged, it mostly falls towards the cheek, so that an incision between the diseased part and the lower eyelid cannot easily be made, Richter recommends first separating the globe from the upper eyelid; then dividing the superior and lateral attachments of the eye; and, lastly, its connections with the lower eyelid. This mode of operating is said to be the more easy, because the globe of the eye can always be more readily inclined downwards, so as to make room above, than pushed upwards for the purpose of making room below.

Until the optic nerve has been divided, the operator must avoid drawing the eyeball too forcibly forwards.

As soon as the eye has been completely detached, all the inside of the orbit should be very carefully examined, and whatever indurated parts are found, should now be diligently removed.

All writers agree, concerning the propriety of cutting away one or both the eyelids, whenever they are affected with cancerous disease. But, in all other instances, these parts should always be spared.

Authors likewise universally acknowledge the prudence of never leaving the lachrymal gland behind, as it is now useless, and is particularly apt to be the source of those inveterate fungous diseases, which too often follow the operation.

The bleeding is seldom of any importance, generally stopping as soon as the orbit is filled with soft pieces of lint, and a compress and bandage are applied.

When the patient suffers violent pain after the operation, an anodyne should be given; and, if necessary, repeated in a few hours. The inflammatory symptoms and fever rarely demand any other means, than a low diet, keeping the bowels well open, and giving saline medicines. This plan is only to be adopted a short time, after which, a light preparation of cinchona, and a nutritious diet are to be prescribed.*

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* Bertrandi recommends the employment of a scalpel, the cutting edge of which extends only a little way from the point. By this means, the operator will run no risk of wounding the eyelids. All the necessary incisions are unquestionably made by that part of the edge of the knife, which is near the point, and as the rest of the edge may do injury, and cannot be useful, I think Bertrandi's advice merits attention.

Sometimes, after a week, or ten days, the upper eyelid becomes drawn within the lower one, so that the eyelashes rub against the inside of the latter part, and cause a painful irritation. This inconvenience may be prevented by means of a slip of adhesive plaster, with which the upper eyelid is to be held upward towards the forehead.†

Although the operation mostly succeeds when the disease is limited to the eyeball; the event is extremely doubtful, when the adjacent parts are affected, or when the case is a fungus hæmatodes.

Sometimes, the granulations, which are formed in the orbit after the operation, are flabby and indolent, in which circumstance, a mild astringent should be applied; as, for instance, lapis calaminaris, pulvis myrrhæ, alumen ustum, &c. In certain examples, the granulations acquire a fungous and malignant nature, in which event, they should either be cut away with a scalpel, or be destroyed with caustic. Too often, however, the fungus is continually reproduced, and proves fatal. The records of surgery inform us, that, in some cases, the cure has appeared perfect, for half a year, or more, and then a fungous excrescence has arisen and proved fatal.‡ Sometimes, a few days or weeks after the operation, headachs, vomiting, convulsions, &c. have been known to come on, and end fatally.§ It is said, that, in such cases, the cancerous distemper has been discovered to have spread to the brain, along the optic nerve, and to have excited induration and ulceration of that viscus. That the fungus hæmatodes also does so is no longer doubtful. Convulsions, after the operation, were suspected in one case to be owing to the pressure of the lint in the orbit on the optic nerve; and, hence, Mr. Ware is in the habit of not introducing dressings within the eyelids.‖

That carcinoma will sometimes recur, even though every discernible portion of the distemper has been most carefully removed,¶ is an unfortunate truth, for which every practitioner should be prepared, in order he may never presume to give a prognosis, to which his reputation may afterwards be sacrificed.

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* Ware, in Trans. of the Med. Society of London, vol. 1, p. 154.

† Idem, op. cit.

‡ Richter's Anfansgr. der Wundarzn. band 3, p 422.

§ Mohrenheim, Beobachtungen, 2 band.

‖ Ware, in Trans. of Med. Society of London, vol. 1, p. 152.

¶ Sabatier in speaking of M Louis's mode of extirpating the eye remarks: "J'ai assisté à quelques unes de ses operations, qui ont été

When the operation answers, and the cure is complete, the patient can seldom wear an artificial eye, on account of the manner, in which both the eyelids shrink to the upper and lower margin of the orbit, and he is generally obliged to be content with wearing a compress, or a pair of spectacles, in which there is a piece of glass somewhat opaque, in order to conceal the disfigurement produced by the loss of the eye.

When a fungous malignant excrescence grows from the cornea, there is no occasion to extirpate the whole eye. According to Richter, it will be quite enough to cut away the anterior portion of the organ, as the base of the fungus seldom extends beyond the edge of the cornea. The operation may be effected by making a puncture in the eye with a lancet, a little way behind the margin of the cornea, and then carrying the wound all round the fungus with a pair of scissars. This being done, the coats of the eye, at the circumference of the incision, must be examined, and, if diseased, they must be carefully removed.*

CHAP. XXIV.

FUNGUS HÆMATODES OF THE EYE.

THE best informed surgeons scarcely know what forms of disease should alone be called cancer of the eye. We here meet with no distempers, which exhibit the peculiar scirrhous structure, that is so generally allowed to be characteristic of carcinomatous disease; but, yet, this organ is frequently attacked with many morbid affections, which in point of malignity, and incu-

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faites avec beaucoup d'adresse et de facilité. Il pourroit cependant se faire que l'extirpation de l'œil ne reussit pas. On sait, en effet, avec quelle fureur le cancer, se reproduit quelquefois. Louis l'a éprouvé dans un cas, où il avoit fait son possible pour extirper, celui dont l'oeil étoit affecté, en emportant, cautérisant, et brûlant les callosités à mesure qu'elles se présentoient. Le mal est revenu, comme il arrive en d'autres parties du corps." De la Médécine Opératoire, tom. 3, p. 58.

* Anfangsgr. der Wundarzn. band. 3, p. 423.

rability, are not less dreadful, than the cancer of other parts of the body, and have generally received the same appellation. Some of these disorders have been noticed in the preceding chapter. It remains for me to describe the fungus hæmatodes of the eye; a disease that has been long remarked by surgical practitioners; though, until lately, always classed by them with cancers, and very imperfectly explained.

It now appears, that this disorder, instead of being allied to cancer, partakes of the same nature, as the equally peculiar affection, called fungus hæmatodes, to which, as I have related in the first part of this work, many structures are liable, some of which have never been known to be the seat of true carcinoma.

The second and twelfth chapters of Mr. Wardrop's late publication,* are much the most valuable; the one as containing a clear description of the fungus hæmatodes of the eye, a case which previously had not been distinctly explained; the other, as furnishing us with an excellent comparative view of fungus hæmatodes and cancer.

According to this gentleman, the first appearances of a fungus hæmatodes of the eye are in the posterior chamber. The pupil becomes dilated and immoveable, and is of a dark amber, or greenish hue, instead of its natural deep black colour. Mr. Ware states, however, that the first symptom is a white shining substance in the posterior part of the eye, visible through the pupil in some particular positions of the head; but, not in all.† As the disease advances, this deviation from the natural appearance of the pupil is discovered to be produced by a solid substance, which is formed at the bottom of the eye, and gradually approaches the cornea. At length, the excrescence occupies the whole interior of the eye behind the iris, and appears through the pupil to be of an amber or brown colour. In this stage of the disease, Mr. Wardrop has known two cases, which were mistaken for cataracts, and in one of them an experienced surgeon actually attempted couching.‡ Fungus hæmatodes of the eye, even at its commencement, says Mr. Ware, bears a slight resemblance to a cataract; but, an attentive person will at once discover the difference between the two disorders; the opacity of the cataract lying close behind the pupil, whilst, in the fungus hæmatodes, it is deeply situated in the posterior part of the eye. In the cataract, also, the pupil retains the power of dilating and contracting in different degrees of light; but, in the fungus hæmatodes, the pupil never varies its size, and is usually dilated.*

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* See Obs. on Fungus Hæmatodes, or Soft Cancer, 1809.

† Trans of the Med. Society of London, vol. 1, p. 141.

‡ Op. cit. p. 11.

When the disease advances still further, the form of the eye-ball begins to alter, acquiring an irregular knobby appearance; and, at the same time, the sclerotic coat loses its natural pearly white colour, and becomes of a dark blue, or livid colour. The tumor, by its continued growth, finally occupies the whole anterior chamber; and, in some cases, a quantity of purulent matter collects between the diseased mass and the cornea.

At last, the cornea ulcerates, and a fungous tumor shoots out, or else the excrescence makes its way through the sclerotic coat, and is then covered with the conjunctiva.

The protruded fungus is generally rapid in its growth, often attains a large size, is of a dark red, or purple colour, has an irregular surface, and is frequently covered with coagulated blood. It bleeds profusely from the slightest causes, and, when it is large, its most prominent parts are apt to slough.

In the course of the disease, the absorbent glands, about the parotid gland, and lower jaw, become affected, sometimes attaining an enormous size.

On dissection, the retina is mostly found quite annihilated, the diseased mass, extending forwards from the entrance of the optic nerve. Sometimes, the tumor pushes before it the choroid coat, and ultimately occasions its total absorption; while, in other instances, this membrane remains in its natural situation, having no apparent connection with the disease. The morbid growth itself has a medullary or brainlike appearance, its consistence and colour, however, being subject to some variety.

In some cases, the optic nerve becomes thicker, firmer, and harder, than common, assumes a brownish ash-colour, and loses its natural tubular appearance. In other instances, the nerve, besides being altered in its structure, is split into one, or more pieces, the morbid growth filling up the intervening spaces, and surrounding the different portions of the nerve. The divided parts of the nerve are entirely deprived of their proper structure and colour.

Among many other particulars, Mr. Wardrop mentions, that when the optic nerve is diseased, the alteration in its structure generally extends as far up as its junction with the opposite nerve. In many cases, it extends further, the thalamus being converted into an irregular, soft pulpy mass, more or less blended with blood. Sometimes, the dura mater and pericranium exhibit dark red coloured spots; and, on other occasions, the tunica arachnoides and pia mater are studded with numerous white spots, which, on being cut into, are found to be small bags, or abscesses containing a white viscid fluid, like cream.

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* Trans. of the Med. Society, loco cit.

It appears, that children are far more subject, than adults, to fungus hæmatodes of the eye; for, out of 24 cases, with which Mr. Wardrop has been acquainted, 20 have been in children under 12 years of age. Bichat informs us, that more than a third of the patients, on whom Desault operated for carcinoma of the eye, were under the same early age; and this circumstance is not surprising, when we reflect, that this eminent surgeon did not discriminate fungus hæmatodes from cancer. The truth is, the latter distemper mostly afflicts persons advanced in years; while the former prevails most frequently in children; a circumstance strongly proving the dissimularity of the two affections.

According to the observations of Mr. Wardrop, when the fungus hæmatodes, takes place in children, they generally lose the sight of the affected eye, before the disease is at all noticed by the parents. In many cases, however, the appearance of the diseased substance at the bottom of the eye is preceded by a blow and inflammation of the organ. But, when no external violence is concerned, the first perceptible symptom is merely a little fulness of the vessels of the white of the eye. Sometimes, the iris is full of vessels, its colour changes, and the pupil is considerably dilated and motionless. The child seldom complains of much pain; but, sometimes appears languid and feverish.

In adults, the disease generally begins without any apparent cause; though, sometimes, it seems to arise in consequence of a blow. As in children, it commences with a slight redness of the conjunctiva, and an impairment of vision. These symptoms increase slowly, and, at length, are followed by headachs, which often become exceedingly agonizing, especially during the night, and continue with violence, until the eye bursts, and the humours are discharged.

In most cases, only one eye has been affected with the disease. In some examples, however, the distemper extends to both.*

As surgeons are utterly unacquainted with any internal, or external medicines, which have the power of checking or curing the fungus hæmatodes of the eye; and as it is the nature of the disease to extend its ravages, till the patient is destroyed; the only chance of preservation depends upon the early extirpation of the affected eye, care being also taken to remove every part in the orbit having any appearance of participating in the distemper. Hitherto, however, the disease has mostly recurred after the operation, and ultimately proved fatal. Such practitioners, indeed, as know, how soon the disorder generally spreads along the optic nerve, must already be prepared for this unfortunate truth. But, as we are not informed of any means, by which the patient can possibly be saved, except the operation, this is not to be abandoned. In surgery, as in every thing else, desperate circumstances always justify desperate expedients; and how small soever the chance of success may be, if it is the only one, it ought not to be lost. The nature of the present disease makes the necessity for an early performance of the operation, extremely pressing; for, it has been proved, that in the commencement of the affection, it is not every case that is attended with a morbid change of the optic nerve.* Still the prognosis cannot but be unfavourable, both because we know of only few examples, in which a cure has appeared to be at all permanent;† and because fungus hæmatodes seems frequently to be a distemper of the system, and to affect many different parts together.

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* See Med. Obs. and Inquiries, vol. 3, p. 133—137. Saunders on Diseases of the Eye, p. 121.

CHAP. XXV.

GUTTA SERENA, OR AMAUROSIS.

A BLINDNESS, depending on a paralytic affection of the retina and optic nerve, is termed *gutta serena*, or *amaurosis*.

The disease is either *complete*, or *incomplete*; *inveterate*, or *recent*; *continued*, or *periodical*.

SYMPTOMS, VARIETIES, &c.

Almost all the symptoms of a gutta serena are fallacious. In many cases, the pupil is dilated, immoveable, and retains its natural black colour and transparency. But, sometimes, in the most complete and incurable gutta serena, the pupil is of its natural size, and in a few instances, is capable of motion.* Occasionally, instead of being dilated, it is exceedingly contracted. The pupil of an eye, affected with this malady, seldom exhibits the clear shining blackness, which is seen in a healthy state of this organ; for the most part, this aperture has a dull, glassy, or horny appearance. Sometimes its colour is greenish. In some instances, it seems whitish and opaque, so as to be mistaken for an incipient cataract. The white appearance in the pupil generally arises from a reflection of light from the retina, in consequence of this membrane having lost its natural transparency.

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* See some cases quoted by Wardrop, op. cit. p. 28.

† In Mr. Wardrop's work, p. 81, a case is related, where the patient had had no relapse ten months after the operation. Mr. Hey has also mentioned an instance, in which the disease had not recurred, five months after its extirpation. See Pract. Observations in Surgery, p. 290, edit. 2.

Ritcher mentions a certain obliquity of sight, a circumstance long ago particularly adverted to by Mr. Hey,† as the only symptom invariably connected with amaurosis.

In particular cases, the paralysis is not confined to the retina and iris; but extends also to the eyelids.

The blindness, produced by the gutta serena, is generally preceded by an appearance of numerous insects, or substances like pieces of cobwebs, interposing themselves between the objects and the eye. The origin of a cataract, on the other hand, is usually attended with a simple cloudiness in vision.

As Scarpa observes, the *complete inveterate amaurosis*, with organic injury of the substance, constituting the immediate organ of sight, is a disease absolutely incurable. The *incomplete recent amaurosis*, particularly, that which is periodical, is ordinarily incurable; for, it is mostly sympathetic with the stomach and primæ viæ, or dependent on causes, which, though they affect the immediate organ of sight, are capable of being dispersed, without leaving any vestige of impaired organization in the optic nerve or retina.

When amaurosis has prevailed several years, in persons of advanced age, whose eyesight has been weak from their youth; when it has come on slowly; at first, with a morbid increase of sensibility in the immediate organ of sight, then with a gradual diminution of sensation in this organ, to the state of utter blindness; when the pupil is motionless, and has lost its circular shape, without being very much dilated; when this aperture is dilated in such a degree, that the iris seems, as if it were, wanting, and its margin is irregular and fringed; and when the bottom of the eye, independently of any opacity of the crystalline, presents an unusual paleness, like that of horn, or else a greenish hue; the malady may generally be considered incurable. Those cases may also be deemed irremediable which are attended with universal headach, and a constant sense of tension in the eyeball; which are preceded by a violent, protracted excitement of the whole nervous system, then by general debility, and langour of the whole constitution. There is no remedy for such cases as are preceded or accompanied by epileptic fits, or frequent hemicrania; nor for such as are the consequence of severe, obstinate, internal ophthalmies. We may also set down those cases as incurable, which, besides being of long standing, have originated from violent concussions of the head, or blows on the eyeball. The same may be said of amaurosis, when it arises from a violent contusion, or laceration, of the supra-orbitary nerve;* when it proceeds from the entrance of foreign bodies into the eyeball; when it is attended with exostoses on the forehead, sides of the nose, or os maxillare: and when conjoined with a manifest change in the figure and dimensions of the whole eyeball.

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* See Richter's Anfangsgr. der Wandarzneykunst, band. 3, p. 424, Janin, Mémoires sur l'Oeil, p. 426; and Schmucker's Vermischte Chirurgische Schriften, band, 2, p. 13.

† In Med. Obs. and Inquiries, vol. 5.

On the contrary, all cases of *incomplete recent amaurosis*, are mostly curable, when not produced by any causes, capable of contusing, or destroying, the organic texture of the optic nerve and retina, and when the immediate organ of sight retains some sensibility to the impression of light. Recent and sudden cases,† in which the pupil is not excessively dilated, and in which the disk of this aperture retains its regularity, while, behind it, the bottom of the eye is of a deep black colour; cases, which are not accompanied by any acute and continual pain in the head and eyebrow, nor by any sense of constriction in the eyeball; cases, which originate from violent emotions of the mind; excessive fulness of the stomach; irritating matter in this viscus; plethora; suppression of some habitual evacuation; great loss of blood;

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* Scarpa informs us, that out of many cases of this kind, he is only acquainted with one instance, in which a cure was effected. It is an example related by Valsalva in his Diss. 2. § 11. Mr. Hey, however, has recorded another example. See Medical Observations and Inquiries, vol. 5.

† Schmucker remarks, that though the complete amaurosis is mostly a gradual disease, it sometimes comes on quite suddenly. This distinguished surgeon affirms, that he has often seen such cases, and constantly found them more easy of cure, than when the access of the disease has been more gradual. See Vermischte Chirurgische Schriften, band. 2.

nervous debility, of not an inveterate nature, in young subjects; are all, generally speaking, curable. Amaurosis is also remediable, when it comes on during convulsions; the efforts of difficult parturition; towards the termination of acute, or intermittent fevers; and when the malady partakes of a periodical nature, having regular intervals of subsidence.*

TREATMENT OF GUTTA SERENA.

The most consummate continental surgeons all agree, that this disease, in its curable, and incomplete state, commonly depends on a morbid irritation of the gastric system, sometimes being also complicated with general nervous debility, in which the eyes participate.

Hence, the chief indications in the majority of recent, incomplete cases, is to empty the stomach and bowels; then to strengthen the tone of the digestive organs, together with that of the whole nervous system; while, at the same time, efforts are made to invigorate the action of the nerves of the eye in particular.

In the early part of the treatment, emetics and internal resolvents completely answer the purpose. Three grains of the antim. tart. (for an adult) are to be dissolved in six ounces of water, and one spoonful of this mixture is to be administered every half hour, until it produces nausea, succeeded by copious vomiting. On the following day, Scarpa recommends the exhibition of resolvent powders, composed of an ounce of cream of tartar, and a grain of the antim. tart., divided into six equal parts, one of which is to be taken in the morning, another four hours afterwards, and a third in the evening, for eight or ten days in succession. These powders will create a little nausea, a few more alvine evacuations than usual, and, perhaps, in the course of a few days, vomiting.

If during the use of these resolvent powders, the patient should make vain efforts to vomit, should complain of bitterness in his mouth, loss of appetite, and no melioration of his sight, an emetic must be repeated. The latter medicine is to be given a third, and even a fourth time, should the presence of irritating matter in the gastric system, the bitter taste in the mouth, the tension of the hypochondria, the acid eructations, and the inclination to vomit, make it necessary. For, as Scarpa remarks, the first emetic often only produces an evacuation of an aqueous fluid, blended with a little mucus; but, if it be repeated a few days after the resolvent powders have been administered, it occasions a discharge of a considerable quantity of yellow greenish matter, with great relief to the stomach, head, and eyes.

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* See Scarpa's Saggio di Osservaz. sulle Malattie degli Occhi, cap. 19.

This part of the treatment having been strictly put into practice, Schmucker's,* or Ritcher's,† resolvent pills are to be ordered. Under this plan, the patient sometimes begins to perceive the outlines of objects, the very day on which he takes the emetic; at other times, he does not reap this benefit till the fifth, seventh, or tenth day; and, in some instances, not before some weeks have elapsed after the exhibition of the emetic, and the uninterrupted use of the resolvent powders and pills.

As soon as the state of the gastric system has been improved in this manner, the surgeon is to prescribe a powder composed of ℥j of bark, and ℥ss. of valerian, divided into six equal parts, one of which is to be taken, in any convenient vehicle, every morning and evening. These powders are to be continued, at least, five or six weeks. The diet must consist of nourishing and easily digestible food, with a moderate quantity of wine, and the patient should have, if possible, very good air, and take proper exercise.

In order to excite the languid nerves of the eye, Scarpa directs the vapour of the aqua ammoniæ puræ to be applied to the organ, till a copious secretion of tears, and redness are brought on; then the practitioner is to desist a little; but he must renew the application in this manner three or four times at once, and persevere till the amaurosis is cured.

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* ℞ Gum. sagapan,
Galban. } āā ʒi.
Sap. venet.
Rhei opt. ʒiss.
Antim. tart. gr. xvj.
Suc. liq. ʒj—fiant pilulæ gran. quinque.

Three of these pills to be taken every morning and evening, for a month or six weeks.

† ℞ Gum. ammon.
Ass. fœtid.
Sap. venet. } sing. ʒij.
Rad valer. s. p.
Summit. arnicæ
Antim. tart. gr. xviij.—fiant pil. gran. quinque.

Six to be taken thrice a day for several weeks. I have directed the pills to be made larger, than the foreign surgeons prescribe, as it would seem almost ridiculous in this country to order fifteen pills to be taken, two or three times a day, as Richter and Schmucker do on the continent; although it is proper to mention, that medical practitioners abroad reckon it advantageous to make the pills very small, in order that they may have a larger surface exposed to the action of the stomach and bowels.

The action of the ammoniacal vapours may be aided by other external stimulants, applied to such parts of the body as have a great deal of sympathy with the eyes. Blisters to the nape of the neck; frictions, with liniments on the eyebrow; sternutatories; and electricity; are the chief auxiliary means.

The periodical amaurosis does not derive benefit from bark, as might be expected, unless emetic and resolvent medicines be previously exhibited.

There are cases of incomplete amaurosis, in the formation of which other causes operate, besides the most frequent one already stated: these examples demand the employment of particular curative means. Such is the instance, which takes place suddenly, in consequence of the body being excessively heated; exposure to the sun; and violent anger in plethoric subjects. This case requires, above all things, general and topical bleedings, and the application of cold washes to the eye and whole head. Then an emetic should be given, and the patient purged with kali tartariz., or small repeated doses of antim. tartariz.

In the amaurosis, arising from the suppression of the menses, the first evident indication is to re-establish the evacuation of blood from the uterus. Scarpa directs leeches to the labia pudend., and bathing the feet in warm water. Then an emetic, and the above resolvent pills. If these remedies fail, this eminent practitioner speaks, with great confidence, of a stream of electricity, conducted from the loins across the pelvis, and thence repeatedly to the thighs and feet.

The amaurosis, which is induced by grief, or fright, may be cured, if we are to believe the observations of the experienced Schmucker, by first exhibiting tartar emetic, then the resolvent pills, and, lastly, bark and valerian.*

In such cases, as seem to depend upon nervous debility of the eye, or constitution at large, and are sometimes brought on by immoderate study by candle light, Scarpa recommends the treatment to begin with small divided doses of the tincture of rhubarb, for the purpose of emptying the primæ viæ. Cordial and tonic medicines are afterwards to be exhibited; and, lastly, the decoction of bark, with valerian, or the infusion of quassia with a few drops of the vitriolic æther to each dose. Nutritious food is to be allowed, and the patient is to avoid, as much as possible, straining his eyes, and every thing that troubles his mind. He is to walk or ride out in fine weather, and bathe in the sea in the summer. The vapour of the spir. ammon. comp.* is to be applied to the eye itself, three or four times a day, or if this application is not strong enough, the vapour of the aqua ammoniæ puræ may be employed. When the sight improves, the eye is always to be protected from the effect of too vivid light by plain green glasses.

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* See Vermischte Chirurgische Schriften Von Johann Leberecht Schmucker, band. 2.

Various sternutatories, or snuffs, have gained repute for their efficacy in cases of amaurosis. Schmucker has employed, for this purpose, a powder composed of a scruple of betony, and two grains of hydrargyrus sulphuratus; or else one consisting of a dram of quicksilver, three drams of white sugar, one of white lilies, and one of valerian, all well blended together. Mr. Ware, whose experience is also favourable to the trial of sternutatories, recommends ten grains of the hydrargyrus sulphuratus, mixed with a dram of common sugar.

Mr. Hey, one of the most able and candid practical surgeons of the present day, has proved, by a series of facts, the great efficacy of electricity in relieving certain cases of the present affliction. He first placed his patients on the electrical stool, and drew sparks from the affected eye. This plan was after a little while repeated. Slight shocks were afterwards directed, from the occiput towards the eyebrow and forehead. In conjunction with this means, bleeding was practised, if deemed necessary, and the following medicine was sometimes given at night: ℞ calomel. camphoræ ā ā gr. iij. conserv. rosæ q. s. ft. bolus.†

In consequence of calomel having been given in these examples, Scarpa seems inclined to impute most of the benefit to it; but, it is to be observed, that, Mr. Hey did not always prescribe medicine, and yet the electricity succeeded. However, Mr. Ware, and several other gentlemen have now added the weight of their testimony, in support of the frequent good effects of electricity on amaurosis, so that this point can no longer be a matter of controversy.‡

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* This is nearly the same thing as what Scarpa calls the aromatic spirituous vapour.

† See Medical Obs. and Inquiries, vol. 5.

‡ "Vestuleis rapporte la guérison d'une amaurose de quatre ans, qui a été ainsi guérie. Floyer vante également ses succés sur ce point, dans une lettre écrite au Docteur But. M. de la Sausure a également réussi sur une femme, par des commotions convenablement ménagées." See Encyclopédie Methodique, Partie Chir. Art. Amaurose.

CHAP. XXVI.

CATARACT.

WHEN the crystalline lens, or its capsule, is affected with opacity; the species of blindness, thence resulting, is denominated a *cataract*.

SYMPTOMS, PROGRESS OF THE DISEASE, &C.

This opacity originates, for the most part, gradually, and augments in the same manner. Sometimes, however, the malady makes its appearance suddenly, and in a very high degree. The first effect of an incipient opacity is a mist before the eyes, surrounding every object, and afterwards gradually increasing so much in density, as to render things quite invisible. The opacity, behind the pupil, increases in proportion as the cloudiness in vision augments. As the lens is thick at its centre, and thin at its edge, the incipient opacity, when viewed externally, always seems the greatest in the middle of the pupil; while the circumference of the lens appears like a black ring, surrounding the white nucleus of the crystalline. Some rays of light are capable of penetrating the thin margin of the lens in its most opaque state; and hence, patients with cataracts are almost always able to distinguish light from darkness, and, in the early stage of the complaint, discern objects best, when these are a little on one side of the axis of vision, and not immediately opposite the eye. Hence, also, such patients see better in a moderate, than a brilliant light, which makes the iris contract over the thin circumference of the lens.

DIFFERENT KINDS OF CATARACTS.

When the opaque lens is either more indurated than in the natural state, or retains a moderate degree of consistence, the case is termed a *firm* or *hard cataract*. Mr. Pott, has explained, in his usual elegant style, that an opaque lens is very rarely firmer than, or even so firm as, a healthy one; and both this eminent surgeon and Richter make it appear probable, that the harder a cataract is, the thinner and smaller it becomes. The latter states, that a *firm* cataract usually presents either an ash-coloured, a yellow, or a brownish appearance. The interspace between the cataract and pupil is very considerable. The patient very distinctly discerns the light, and can even plainly perceive large bright objects. In the dilated state of the pupil, a black circle, surrounding the lens, is very perceptible. The motions of the pupil are free and prompt; and the anterior surface of the cataract appears flat, without the least degree of convexity.

When the substance of the lens seems to be converted into a whitish, or other kind of fluid, lodged in the capsule, the case is denominated a *milky*, or, *fluid cataract*. According to Richter, this species of the malady has usually a white appearance, while irregular spots and streaks, different in colour from the rest of the cataract, are often observable on it. These are apt to change their figure and situation, when frequent and sudden motions of the eyes occur, or when these organs are rubbed or pressed. The lower half of the pupil seems more opaque, than the upper one. The crystalline lens, as it loses its firmness, commonly acquires an augmented size. Hence, the fluid cataract is thick, and the opacity close behind the pupil. Sometimes one can perceive no space between the cataract and margin of the lens. In advanced cases, the pupil is in general extremely dilated, and the iris moves very slowly and inertly, in consequence of the cataract touching this membrane, and impeding its action. Patients, who have milky cataracts, usually distinguish light from darkness very indistinctly, and sometimes not at all; partly, because the cataract, when bulky, lies so closely to the iris, that few, or no rays of light can enter between them into the eye; and partly, because the fluid cataract always assumes a globular form, and, consequently, has no thin edge, through which the rays of light can penetrate.

When the opaque lens is of a middling consistence, neither hard, nor fluid, but about as consistent as a thick jelly, or curds, the case is termed a *soft*, or *caseous cataract*.

As the lens softens in this manner, it commonly grows thicker and larger, even acquiring a much greater size, than that of the fluid cataract. Hence, this species of the malady impedes the motion of the pupil even more considerably, than the latter sort of case.

The only other species of the disease, necessary to be noticed in this work, is the *secondary membranous cataract*, which is an opacity of the anterior or posterior layer of the crystalline capsule, taking place after the lens itself has been removed from this little membranous sac by a preceding operation.

All cataracts may be complicated with other diseases of the eyes, chronic ophthalmy, lippitudo, amaurosis, adhesion of the opaque lens to the iris, &c.

A species of amaurosis, sometimes accompanying a cataract, is described as being very rapid in its progress, and producing blindness in the course of a few days. The pupil is dilated, the lens protrudes, the convex iris seems to touch the cornea, the humours of the eye are turbid and dim, and the vessels of the conjunctiva and sclerotica are unnaturally large, and run in distinct clusters. The disease remains stationary, and incurable, with occasional pains of the eye, or head.

A less advanced state of the disorder may be ascertained, by the pupil being somewhat dilated and still, or else sluggishly contracting over a yellowish lens, even in a strong light; and there is a tendency in the vessels on the anterior part of the globe to assume a fascicular arrangement.

Another more common form of amaurosis is also mentioned, in which the pupil is not only motionless, or nearly so; but, is also contracted and irregular. This disease is slower in its progress, than the preceding case, and generally incurable.*

CAUSES, &C.

Though persons, above the age of forty, are reckoned more liable to cataracts, than younger ones, the disease is by no means unfrequent in the latter; even children are often seen affected with this kind of blindness, and, as I shall hereafter have occasion to notice more particularly, some are born with it. Persons exposed to strong fires, as blacksmiths, glassmen, &c. are more subject to this affliction, than the generality of mankind. But, commonly, a cataract seems to rise spontaneously, without any assignable cause. In a few instances, external violence occasions the opacity of the lens: a case, which more frequently, than any other, gets well without an operation.

TREATMENT.

Many internal medicines have been exhibited with a view of dispersing opacities of the crystalliie lens. None seem to have obtained the confidence of experienced men. The remedies, which Mr. Ware has found more effectual, than others, are the application of one, or two drops of æther to the eye itself, once or twice a day, and the occasional rubbing of the eye, over the lid, with the point of the finger, first moistened with a weak volatile, or mercurial liniment.

Some little attention is requisite to distinguish the cases of cataract, which afford a reasonable prospect of benefit from an operation.

There is always reason to expect success, when, in the incipient state of the disease, the patient discerned objects, as it were, through a mist, which, increasing in density, at length became a complete impediment to vision; when the opacity of the crystalline lens supervened gradually, unpreceded, and unaccompanied by, internal ophthalmy; when no particular headach, nor pains in the eye and eyebrow have been experienced; when the pupil preserves its circular figure, and the faculty of varying its dimensions in the different degrees of light; when the patient can distinguish light from darkness; and, especially, when in a moderate light, where the pupil is usually not too much contracted, he is able to discern bright colours, and the outlines of objects.

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* See Saunders's Treatise on Diseases of the Eye, chap. 5.

A case, answering this description, is the most favourable one; but, almost any case, unattended with gutta serena, may derive benefit from an operation, and no serious harm can ever result from the attempt.

Cataracts are usually cured, either by removing the opaque lens from the axis of vision by means of a needle; or by extracting the lens from the eye, through a semicircular incision made at the lower part of the cornea. The first operation is termed couching, or depression, of the cataract; the second is named extraction. To these two methods is now to be added the mode of operating devised, and practised, with vast success, by the late Mr. Saunders, and which chiefly consists in lacerating the central part of the front layer of the capsule, without moving the lens at all out of its situation.* The particulars of Mr. Saunders's method of curing cataracts, however, shall be reserved for the latter part of the present chapter. With regard to depression and extraction, each method has its advocates; and as I have given a detail of the arguments in favour of couching in another publication,† I shall only premise a description of this operation by stating, that it is applicable to every species of the malady; that it produces subsequent symptoms far less severe and dangerous, than those, which frequently happen after extraction; that it may be successfully repeated, when any incidental circumstance has rendered the primary attempts fruitless; that it is much the most easy operation of the two; that it is not so liable as extrac-

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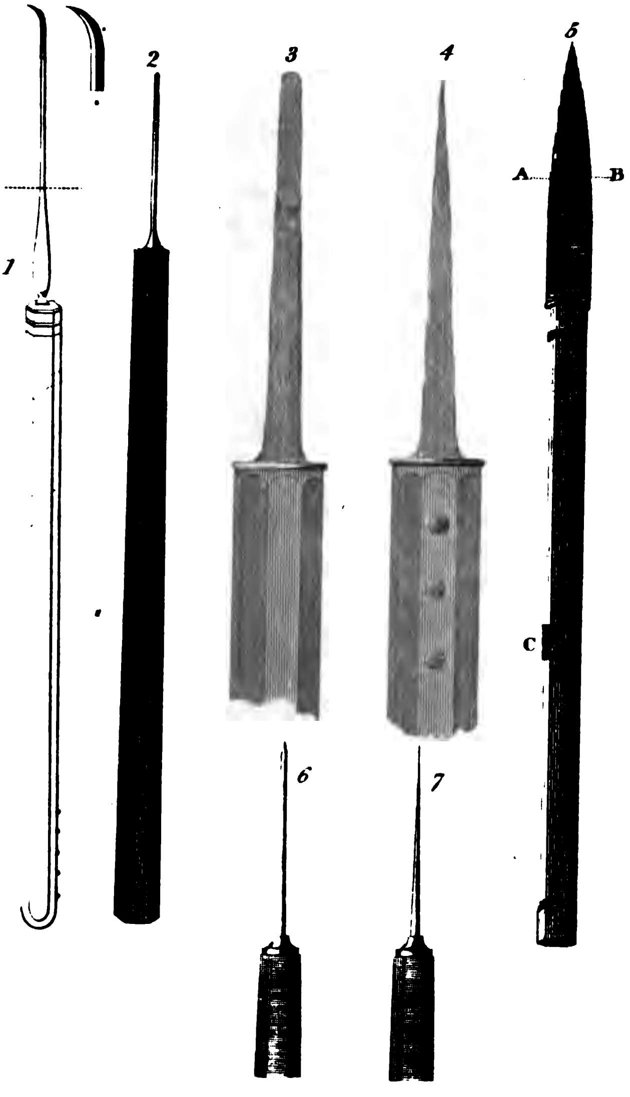
* The essential part of this third operation, as far as art is concerned, being that of making a proper aperture in the capsule, it may be said, according to Dr. Farre, to be *an operation on the capsule*, in contradistinction to extraction and depression, which imply principally the removal of the lens from its seat, p. 161.

† Critical Reflections on several important practical Points relative to the Cataract, 1805.—Published by Longman and Co.

Wenzel's Knife for the Extraction of the Cataract & Scarpa's; Hey, and Saunders's Needles for Couching.



Published April 1,1807 by R. Phillips, Bridge Street, Blackfriars, London

Cooper sculp^{t}

tion to be followed by the secondary membranous cataract; and that Pott, Callisen, Lucas, Scarpa, Hey, Latta, and many other eminent and unbiassed surgeons have given it the preference.

DESCRIPTION OF COUCHING, OR DEPRESSION OF THE CATARACT.

The best needle is the one, which Scarpa employs,* or else that used by Mr. Hey.† If the curved couching needle is made use of, it is to be held with the convexity of its curvature forward, its point backward, and its handle parallel to the patient's temple. The surgeon, having directed the patient to turn the eye towards the nose, is to introduce the instrument boldly through the sclerotic coat, at the distance of not less than two lines from the margin of the cornea, in order to avoid the ciliary processes.

The exact place, where the point of the needle should next be guided, is between the cataract and ciliary processes, in front of the opaque lens and its capsule; but, as the attempt to hit this delicate invisible mark borders upon impossibility, and might even endanger the iris, it seems safer to direct the extremity of the instrument immediately over the opaque lens, and, in the first instance, to depress it a little downward with the convex flat surface of the end of the needle. Thus room is made for the safe conveyance of the instrument, between the cataract and ciliary processes, in front of the diseased crystalline and its capsule. Care must be taken, in this latter step of the operation, to keep the marked side of the handle forward, so as to have the point of the instrument turned away from the iris. The needle will now be visible in the pupil, and its point is to be pushed in a transverse direction as far as the inner edge of the lens. Then the operator is to incline the handle of the instrument towards himself, by which means, its point will be directed through the capsule into the substance of the opaque lens; and on inclining the needle downward and backward, the former will be lacerated, and conveyed, with the latter, deeply into the vitreous humour.

It is deemed of great importance to lacerate the front layer of the capsule in the operation; for, this plan renders the absorption of the opaque lens more certain and quick afterwards, and the occurrence of a secondary membranous cataract almost impossible.

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* See Plate VI. fig. 1. The part between the handle and the dotted line may be advantageously deducted from its length.

† See Plate VI. figs. 2, 3, 4. The two last are magnified views.

Such is Scarpa's excellent plan of operating for a *firm* cataract.

When the case is a *fluid*, or *milky* one, the contents of the capsule flow out as soon as the little membranous sac is pierced with the needle, and they sometimes completely conceal the iris, the pupil, and the instrument, from the operator's view. The object now is to lacerate the capsule as much as possible. Both the fragments and the extravasation of the milky fluid in the two chambers of the aqueous humour are gradually absorbed after the operation, so as to leave the eye in a transparent state.

When the cataract is *soft*, the particles, of which it is composed, will frequently elude all efforts made with the needle to depress them. This, however, is quite unnecessary. The operator may either be content with a free laceration, and disturbance of them, or he may imitate Scarpa in pushing the fragments of the capsule, and the particles of caseous matter, into the anterior chamber. In this cavity, absorption seems to be carried on with more vigour, than behind the pupil.

When the cataract is a *secondary membranous* one, the surgeon is to turn the point of the needle cautiously towards the pupil, and pierce the opaque capsule. This is to be broken, as far as it is practicable, at every point of its circumference; and the fragments may either be left in their situation, or pushed forward, through the pupil, into the anterior chamber, in the way which Scarpa practises.

When the capsule is adherent to the iris, it may often be separated by skilful and delicate movements of the needle.

If the operator should prefer the straight needle, he must be careful to depress the cataract a little in the first instance, before making any attempt to place the instrument in front of the cataract, in order to be able to depress it, downward and backward, in the most convenient manner. As the point of a curved needle is turned backward, it may evidently be brought forward with more safety than a straight one, which has a tendency to run directly against the iris. Whenever an operator prefers lacerating the front layer of the capsule, and pushing the particles of soft and membranous cataracts forward, he will accomplish his objects with far greater safety by means of Scarpa's needle, than it is possible to effect with a straight one, *provided he is well acquainted with the anatomy of the eye, the scientific mode of using the instrument, and has a tolerably steady hand, and a good eye of his own.*

DESCRIPTION OF EXTRACTION OF THE CATARACT.

Baron Wenzel's knife for dividing the cornea is represented, plate VI., fig. 5. A, the back of the blade; B, its edge; C, a mark on the handle to distinguish the back from the edge of the blade. Mr. Ware employs a knife, which bears a great resemblance to Wenzel's, and chiefly differs from it in being less spear-pointed. The lower edge of Wenzel's knife is sharp throughout its whole length; but, the upper edge, though thin, is not sharp, except to the extent of one-eighth of an inch from the point. Every knife, designed for dividing the cornea, should be so constructed as to increase gradually in thickness from the point to the handle; by which means, as Mr. Ware observes, the aqueous humour will be prevented from escaping before the section is begun downwards. When the aqueous humour escapes prematurely, the iris falls forward beneath the edge of the knife, and is apt to be wounded. The instrument should, therefore, be so contrived, that not a particle of this fluid can escape from the eye, before the lower part of the cornea is completely divided.

The patient is to sit in a low chair, and not in too strong a light, as this makes the pupil contract too much. The sound eye is to be covered with a compress. Both these directions are equally applicable to couching. The surgeon is to raise the upper eyelid with the fore finger of the hand not occupied with the knife, and he is to press the tarsus against the upper edge of the orbit. The operator should be seated a little higher, than the patient, resting his right foot on a stool, in order that his knee may be raised high enough to support the elbow. The knife is to be held like a writing pen, and the little finger of the hand is to rest steadily on the outside of the cheek.

When the eye is still, and so turned towards the outer angle, that the inner and inferior part of the cornea can be distinctly seen, the operator is to plunge the knife into the upper and outer part of this tunic, at the distance of a quarter of a line from the sclerotica, and a little above the transverse diameter of the cornea.

Baron Wenzel objects to making the least pressure on the eye. However, Mr. Ware has so often perceived the ill effects of leaving the eye unfixed at the time of making the incision through the cornea, that he has successfully adopted in practice the plan of employing pressure, just at the instant, when the knife is carried across the cornea, taking care to remove it before any attempt is made to divide this tunic downward. The first process of the incision Mr. Ware calls *punctuation*; the second, *section* of the cornea. He directs the operator to place the fore and middle finger of the hand, not used in holding the knife, upon the tunica conjunctiva, just below, and a little on the inside of the cornea. At the same time, the assistant is to apply one, or if the eye projects sufficiently, two of his fingers upon the conjunctiva, a little on the inside of, and above, the cornea. The fingers of the operator and assistant, thus opposed to each other, will fix the eye, and prevent the lids from closing. The knife is to be pushed through the cornea slowly and steadily, without the least intermission. When about one-third of the blade of Mr. Ware's knife has emerged from the inner part of the cornea, near its margin, the punctuation is completed. The broad part of the blade is now between the cornea and iris, and its edge below the pupil, so that the latter membrane is then, according to Mr. Ware, out of all danger of being wounded. Every degree of pressure must now be taken off the globe of the eye, and, consequently, the fingers, both of the operator and his assistant, are instantly to be removed from this part, and applied only against the eyelids.

The blade of the knife is now to be pressed slowly downward, till it has cut its way out, and divided a little more, than half of the circle of the cornea.

Though Mr. Ware considers the iris out of danger as soon as the knife has completed, what he terms, *punctuation*, the authority of Richter, who has had immense experience in this branch of surgery, might be adduced to prove the contrary; and that if the aqueous humour be allowed to escape before the edge of the knife has begun to divide the lower laminæ of the cornea, the iris is still apt to fall forward, and be cut. Hence, the author of the present volume requests the reader to be very particular in employing a knife which will regularly, as it is introduced, fill the wound; which has a blade broad enough to divide the lower part of the cornea before its point has approached too near the nose; and, lastly, which will affect this object by being merely pressed in a transverse direction, and without any previous escape of the aqueous humour.

The incision of the cornea being accomplished, the next object is to divide the anterior layer of the capsule of the crystalline lens, in order to allow the opaque lens itself to escape. Wenzel, who, no doubt, was a man of uncommon dexterity, used to puncture the capsule with the point of the knife, at the same time, that he was dividing the cornea. Mr. Ware has very properly discouraged this method, by stating, that it is rather a work of dexterity, than usefulness, and is often attended with much hazard of wounding the iris. Even the adroit Baron himself found it necessary, in particular cases, to divide the cornea first, and then open the capsule with a gold needle, made for the purpose.

In general, the exit of the opaque lens very readily follows the division of its capsule, on very gentle pressure being made on the eye. If any fragments of opaque matter remain behind, they are usually taken away by an instrument, resembling a minute spoon, termed a *curette*.

A very small pair of forceps is commonly employed for extracting the capsule itself, when deprived of its natural transparency.

OF THE CONGENITAL CATARACT, AND MR. SAUNDERS'S MODE OF OPERATING.

It will be universally acknowledged, that the merit of the late Mr. Saunders stands exceedingly high. The boldness, judgment, and skill, with which he effected the cure of cataracts, even in infants of tender years, those cases, which custom and prejudice had set down as altogether untractable; and the novelty, ingenuity, tenderness, and unparalleled success of his manner of operating; entitle him to a conspicuous place among the modern improvers of surgery. Many thanks seem also due to Dr. Farre, who has supplied the profession with numerous interesting particulars relative to Mr. Saunders's opinions and practice, in cases of cataract; a task, which could only be performed by one, who was at once the intimate friend and colleague of the deceased. It is from Dr. Farre's account, that I have collected the few annexed observations; and, conscious, that my limits have not allowed me to do justice to so interesting a subject, I should feel deficient in duty, were I to neglect recommending surgeons not to be content with my imperfect detail; but, to have recourse to the treatise, of which Dr. Farre is the editor, and which may be considered as the fountain-head of information.

In the majority of cases of congenital cataract, after the lens has been converted into an opaque substance, it is gradually absorbed; and, in proportion as such absorption proceeds, the anterior and posterior layers of the capsule become approximated, and, at length, form one membrane, which is white, opaque, and very elastic. Among the exceptions to this order of events, is to be noticed a form of the congenital cataract, in which the centre of the lens is opaque, while the circumference is perfectly transparent. In such a case, the lens remains of its natural size, as long as its circumference preserves its transparency; but, as soon as the capsule and lens are penetrated, even with the finest instrument, the opacity spreads with rapidity. From this period, the bulk of the lens is diminished, with more or less celerity, according to the manner, in which the wound has been made.

Congenital cataracts not only frequently attack children of the same parents; but, in this circumstance, are often precisely of a resembling consistence and nature. The lens may be either solid, soft, or fluid; but, more commonly, it is partially, or completely absorbed, and the cataract is capsular. Children, thus affected, possess various degrees of vision. Some see external objects indistinctly; others can discern only bright colours, or vivid lights. If the blindness is nearly complete, as the eyes are not attracted by any external objects, volition is not exercised over their muscles, their actions are not associated, and they roll about with rapidity, and tremble as they move.

In operating upon infants, Mr. Saunders used to overcome every difficulty by fixing the eyeball with Pellier's elevator; controuling the little patients by force; dilating the pupil with the belladonna; and employing a slender needle, armed with a cutting edge from its shoulders to its point, and thin enough to penetrate with the utmost ease.*

The extract of belladonna, diluted with water to the consistence of cream, was dropped into the eye; or, to avoid irritation, the extract itself was smeared over the eyelid and eyebrow. In about half an hour, and seldom later than an hour, the pupil is fully dilated, and the application must then be washed from the appendages of the eye. The child is now to be put on a table, parallel to a window, from which the eye, about to be operated upon, is farthest. Four assistants, and, when the child is stout, five, are required to confine it. The surgeon is to sit upon a high chair, behind the patient, with Pellier's elevator in his left hand, and Mr. Saunders's needle in his right, if it is the right eye, on which the operation is to be done; or with the first instrument in his right hand, and the second in his left, if the operation is to be performed on the left eye.

Here it is necessary to state, that Mr. Saunders used to practise two operations; one is called *anterior*, in which the needle is introduced into the eye in front of the iris; the other, *posterior*, the needle being introduced behind the latter membrane.

When the capsule contained an opaque lens, Mr. Saunders used gently to introduce the bow of Pellier's elevator under the upper eyelid, while an assistant depressed the lower one. At the moment, when he was about to pierce the cornea, he fixed the eye by making moderate pressure on it with the elevator. Such pressure was immediately discontinued, as soon as it was no longer needed. Mr. Saunders used to pierce the cornea, as near its junction with the sclerotica, as would allow the flat surface of the needle to pass, in a direction parallel and close to the iris, without injuring this membrane. When the point of the needle had arrived at the centre of the dilated pupil, Mr. Saunders did not boldly plunge it through the capsule into the lens, nor perform any depressing motion. It was a material object with him, not to injure the vitreous humour, nor its capsule. Neither did he draw the capsule of the lens, with the point of the needle, towards the pupil; for, it was an important part of his plan to avoid displacing the lens. On the contrary, he proceeded with a gentle lateral motion, working, with the point and shoulders of the needle, only on the surface and centre of the capsule, to an extent, that did not exceed the natural size of the pupil. His purpose was to accomplish a *permanent* destruction of this central portion of the capsule, and a simple puncture of it would not have answered the design. His next proceeding was to sink the needle gently into the body of the lens, and moderately open its texture.*

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* See Plate VI. fig. 6 and 7.

Any inflammatory symptoms after the operation were opposed by the application of leeches, or even general bleeding. The extract of belladonna was also applied to the eyebrow, in order to keep the pupil dilated, and its edge out of danger of becoming adherent to the wounded capsule.

A single operation sometimes sufficed, nature producing a dissolution and absorption of the opaque lens. On other occasions, one or more repetitions were necessary, an interval of at least a fortnight being always suffered to elapse between every two operations.

Fluid cataracts of the congenital kind are the least common, and, when these cases are met with, the surgeon, after puncturing the capsule, and letting its contents mix with the aqueous humour, is to do no more for the present, but take the requisite steps for averting inflammation. The case is thus changed into a capsular cataract.

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* The following method, occasionally practised by Pott, has a considerable resemblance to Mr. Saunders's operation: "I have sometimes (says the former) when I have found the cataract to be of the mixed kind, not attempted depression; but, have contented myself with a free laceration of the capsula; and having turned the needle round and round between my finger and thumb, within the body of the crystalline, have left all the parts in their natural situation: in which cases, I have hardly ever known them fail of dissolving so entirely as not to leave the smallest vestige of a cataract." Pott's Chirurgical Works, vol. 3, p. 156, edit. by Earle, 1808.

When the capsule was opaque, the lens having been nearly, or quite absorbed; the practice of Mr. Saunders authorized a freer employment of the needle; though in the manner already detailed. When any portion of the lens remained, as a small nucleus in the centre of the capsule, his efforts were exclusively directed to the detachment of this portion, in order to effect a permanent aperture in the centre of the capsule. When this membrane alone presented itself, his main plan was to form an opening in the middle of it.

When Mr. Saunders practised his posterior operation, *for a capsule containing an opaque lens,* he introduced the needle, in the common way, through the sclerotica. He then gently depressed its handle, so as to direct its point towards the capsule, through the thin edge of the lens; and, pushing the flat surface of the instrument, between the capsule and the lens, he carried it as far as the centre of that membrane. Here he opened the capsule, taking care not to tear it extensively, lest he should dislocate the lens. He then cautiously opened the texture of the lens, and withdrew the needle. In repeating the operation, his aim was to complete the central opening in the capsule, and loosen the texture of the lens. Small flocculi, he allowed to fall into the anterior chamber; but, he endeavoured to avoid forcing large fragments thither.

When the posterior operation was done, and the case was *an opaque capsule, the lens having been nearly, or quite absorbed,* the needle was introduced in a direction obliquely backward, in order to avoid the iris, which, in consequence of the absorption of the lens, was liable to be situated further backward. Any remnant of the lens was first detached; and then the same manœuvres were adopted, as in the anterior operation or capsular cases. The capsule was often so yielding, that a backward, or depressing motion of the needle was sometimes necessary to rend its centre.

It appears, that Mr. Saunders finally gave a preference to the anterior operation, which inflicted slighter injury on the eye, did not disturb the ciliary processes, or vitreous humour, and was less apt to excite inflammation.

The success of this gentleman's practice may be conceived, when it is known, that, of sixty patients, he restored fifty-two to sight by his mode of operating. He operated both on infants and adults. It is observed, also, that his attempts were most successful in children, between the ages of eighteen months and four years.

Among the arguments, mentioned in favour of operating early, two in particular merit attention. First; we are told, that in cases, in which the patient has no perception of external objects, the muscles acquire so inveterate a habit of rolling the eye, that for a very long time after the pupil has been cleared by an operation, no voluntary effort can controul this irregular motion, nor direct the eye to objects, with sufficient precision for the purpose of distinct and useful vision. Secondly; the retina, when not exercised for a long while, is apt to lose a degree of its sensibility.*

CHAP. XXVII.

RANULA.

THE ranula is so common a disease, that every practitioner must have had opportunities of seeing it. It may be defined to be a tumor, arising from a distention of the salivary ducts underneath the tongue, and from an accumulation of the saliva in the dilated part. The cause of this malady is probably owing to an obstruction of the excretory duct either of the sublingual, or inferior maxillary gland.

Such authors, as have made mention of ranulæ, before the organs serving for the secretion of the saliva were known, can have had no precise ideas concerning the nature of the disorder. Munnicks, who possessed a considerable share of modern anatomical knowledge, seems to be the earliest author who understood the true character of the complaint.†

The swelling is usually situated on one side of the frænum linguæ, and, particularly, when it is large, sometimes extends under the apex of the tongue. The tumor consists of a sac, which is composed of the dilated portion of the duct, and is either filled with clear fluid, a purulent matter, or an earthy substance. Unless the tumor has been of long standing, its contents bear a perfect resemblance in colour and consistence to the white of egg. When the disease is less recent, the matter is thicker, and it may become like plaster, or even acquire a calcareous hardness.* Its size varies considerably in different cases, from that of a pea to that of a hen's egg. In some instances, it becomes exceedingly large, elevating the tongue so much, that deglutition and respiration are greatly obstructed, and the pressure may even thrust out the teeth, and render the lower jaw-bone carious.† Some swellings of this kind have been known to contain a pint of matter.

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* See a Treatise on some Practical Points relating to the Diseases of the Eye, by the late J. C. Saunders; to which is added His Method of Curing the Congenital Cataract, by J. R. Farre, M.D. 1811.

† Prax. Chir. lib. 1, cap. 26. Celsus is supposed to have alluded to ranulæ in the 12th chap. of the 7th book, entitled, "De Abscessu sub linguâ."

The shape of ranulæ is subject to variety: some are round; others are oblong;‡ and occasionally, the sac has elongations extending a considerable way backwards under the tongue.

Ranulæ are frequently quite free from pain; but, in some instances, they are very painful, especially, when the tongue is moved; and, in others, they are more or less in an inflamed state.

Encysted tumors are liable to form under the tongue, and cannot easily be distinguished from ranulæ. Indeed, I think, we must agree with Richter, that, in many cases, where ranulæ are reported to have contained a caseous, fatty, or pultaceous substance, the diseases must in reality have been encysted swellings.§ However, as, in both instances, much the same kind of treatment is proper, mistaking one kind of tumor for the other is not of any material importance.

When ranulæ have become as large as a walnut, they sometimes burst spontaneously, and a cure may be the consequence; though in general, the opening is not large enough, or calcareous matter exists in the sac, and the cure is incomplete.

TREATMENT.

From what has been stated, it might be inferred, that the cysts of these swellings ought to be dissected out, in the same manner as those of ordinary encysted tumors. Owing to the particularity of the situation of ranulæ, this is not exactly the case. If the surgeon were to endeavour to take out the whole sac, he could hardly avoid wounding the raninal artery, the hemorrhage from which might prove excessively troublesome, and even fatal.

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* M. Louis, in Mém. de l'Acad. de Chirurgie, tom. 9, p. 95, edit. 12mo.

† See a case recorded by M. Boinet, in Mém. de l'Acad. de Chir. tom. 14, p. 258, edit. 12mo.

‡ "On reconnoit, deux especes de grenoüillettes; les unes rondes, placées sous la langue, semblent n' être produites que par la dilatation du canal excrétoire de la glande sublinguale; les autres sont plus longues que rondes, placées à la partie latérale de la langue, et formées par la dilatation du canal excrétoire de la glande maxillaire inférieure." See M. de la Faye's Notes on Dionis.

§ Richter's Anfansgr. der Wundarzneykunst, band 4, p. 4, edit. 2.

Practitioners in this country are, in general, content with laying open the tumor from one end to the other; squeezing out its contents; and removing every particle of calcareous matter, that can be felt within the wound. Foreign surgeons, after opening the tumor in this manner, very frequently cut away the whole anterior portion of the sac with scissars, and even attempt the destruction of the rest by applying caustics to it. This last proceeding is highly censurable, unless there is reason to believe the case to be an encysted tumor, and fungous granulations should make their appearance.

Cutting away a portion of the sac is, perhaps, the surest mode of cure; for, when a mere incision is too small, or closes prematurely, the disease generally recurs.* After making a free opening into the swelling with a knife, the surgeon can easily cut off a part of the edges of the incision, either with the same instrument, and a pair of forceps, or with a pair of scissars, as he may prefer.

When the substance of a tumor beneath the tongue is fat, as soon as the surgeon has ascertained the nature of the case by an incision, his best plan is to take hold of the swelling with a hook, draw it forward, and carefully take it out, by detaching it from the surrounding parts in front with a bistoury; and breaking the connexion, on the side towards the raninal artery, with his fingers. This may be safely and easily done.

If there should be much bleeding, after either of the operations abovementioned, it may be stopped by pressing some lint into the wound. When this plan does not answer, the patient must first wash his mouth with brandy, and then press a dosil of lint on the wound again.

No dressings can be conveniently kept on the wound; and the surgeon need only cause the part to be frequently washed, by means of a syringe.

Sometimes, when there is no evident swelling, calcareous concretions form in the salivary ducts, and they are apt to occasion pain and uneasiness under the tongue. In some instances, the calculus projects from the orifice of one of the ducts into the mouth, and admits of being drawn out with a pair of forceps. In others, it is necessary to make an incision, for the purpose of extracting the extraneous substance.

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* "J'en ai ouvert plusieurs; et il est presque toujours arrivé, lorsque l'incision n'avoit pas été assez étendue, que les levres de la plaie se réunissoient; et la tumeur se reproduisoit quelque tems après." Louis, in Mém. de l'Acad. de Chirurgie, tom. 9, p. 96, edit. 12mo.

The French surgeons, Desault and Chopart, have proposed introducing a small probe into the obstructed orifice of the salivary duct, in cases of ranulæ, with a view of rendering the tube pervious again, and thus curing the disease. This plan can only be expected to succeed in very recent cases; and the introduction of an instrument into the duct, when closed, is, by no means, a very easy thing.

CHAP. XXVIII.

DIVISION OF THE FRÆNUM LINGUÆ.

A preternatural confinement of the apex of the tongue may arise from two causes; viz. the frænum may extend too far forward, to the very extreme point of this organ; or it may not be of sufficient length to allow the tongue to be duly elevated from the bottom of the mouth. The first malformation is the most common; but, both kinds impede the motion of the tip of the tongue, prevent children from sucking, and cause an incapacity of articulating sounds in a proper manner. Hence, the frænum linguæ of persons born dumb should always be examined. As this defect in the formation of the frænum is supposed by the generality of persons to be an exceedingly common one, and the operation for its relief, is not totally exempt from danger, it is highly necessary for every surgeon to know, that, in infants, an incapacity to suck, in consequence of the evidently immoveable state of the tongue, caused by the above defects, forms the only just ground for dividing the frænum.

Hence, before performing an operation, the surgeon should not be satisfied with merely hearing, that a child cannot suck; as this incapacity may be owing to other causes, particularly, the large size of the nurse's nipple, adhesions of the sides of the tongue to the inside of the mouth, &c. The practitioner ought to examine with his eyes, whether the frænum extends to the apex of the tongue in an undue manner: a thing most easily ascertained, as, in the natural state, about a quarter of an inch of the under surface of the tongue, from the apex backward, remains quite unconnected with the frænum. When this part ties the tongue too closely to the bottom of the mouth, by reason of its shortness, the surgeon cannot raise the tongue towards the palate even with his own fingers.

The operation consists in dividing the frænum, as far as seems necessary; and it is so simple, as to require no particular explanation. The best instrument for performing it is a pair of sharp scissars with blunt points. No more of the frænum ought to be divided, than is essential to the object in view; and pointed instruments should never be employed. The situation of the raninal arteries renders this caution of the highest importance; for, many children have lost their lives by these vessels having been unskilfully wounded by careless, or ignorant operators.

Before the time of M. J. L. Petit, some bad consequences, apt to be produced by the operation of dividing the frænum linguæ, had been little taken notice of by surgical authors. This eminent surgeon, however, had been impressed by experience with the knowledge of these dangers, of which he drew up an interesting and instructive account.* One of the perils, alluded to, is the suffocation of the infant by the tongue turning backwards. Another is an hemorrhage, which occasionally follows the operation.

The frænum serves to confine the tongue, and keep it from being thrown too far backward in the action of deglutition. Now, in the operation treated of above, if an unnecessary incision, or one that is too extensive, be made, the tongue may be carried beyond the narrow part of the throat, and so engaged in the opening of the pharynx, as not to admit of being brought back again into its natural situation. The first opportunity, which Petit had of observing this event, was in a child, that had died about five hours after its frænum linguæ had been divided, and whose body this distinguished practitioner was requested to examine. Upon passing a finger into the child's mouth, he was surprised at not being able to feel the tongue, and at perceiving, that the posterior opening of the mouth was completely stopped up by a fleshy substance. As soon as an incision was made through the cheek, it became evident, that this substance was the tongue itself, which had been thrown into the upper part of the pharynx in the effort of swallowing.

When Petit was sent for to another infant, which had fallen into a state approaching to suffocation, about two hours after its frænum linguæ had been cut, he immediately tried to ascertain the cause of the occurrence. When he introduced his finger into the child's mouth, he found, that the tongue was half displaced backward. There was no difficulty in reducing it; but, the accident recurred several times in the course of the day. Petit conceived, that it was now necessary to have recourse to some mechanical means for the prevention of future displacement. This purpose was fulfilled by means of a thick compress, which was placed on the tongue, and retained with tape applied round the lower jaw. Whenever the infant had occasion to suck, the apparatus was taken off, and put on again immediately afterwards. The little patient was sent into the country, however, where the plan was neglected, and the child was seized with symptoms of suffocation and died.

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* Memoires de l'Acad. des Sciences, pour 1742.

Subsequently to this case, Petit met with other examples, in which children, affected in a similar way, were saved by a perseverance in the method, that he has proposed.

The second dangerous consequence, occasionally resulting from the operation of dividing the frænum linguæ, is an hemorrhage, which takes place, when one of the raninal arteries, or veins, is wounded. This accident has long been well known, and all writers, who have treated of the operation in question, have not failed to notice it. Petit, however, saw the same perilous occurrence take place, even when the large vessels of the tongue were uninjured, and, of course, the bleeding proceeded entirely from such small vessels, as are distributed to the membrane of the frænum itself. The blood, which escapes from them, and collects in the mouth, induces the infant to make continual endeavours to suck, by which means, the bleeding is kept up, until extreme, or even fatal weakness is brought on. As the child keeps swallowing the blood, as fast as it oozes into the mouth, it is possible for the bleeding never to be suspected, until all hopes of recovery are past. Dionis mentions a case, in which the stomach of an infant, that had died a few hours after the operation, was found filled with blood, which had been recently swallowed. But, in regard to the hemorrhage from the small vessels of the frænum, the accident, to which I am now more particularly adverting, it deserves attention, that Petit met with several examples of it. In these, unavailing attempts were made to stop the bleeding with astringent applications, and badly contrived compresses. Hence, Petit was led to invent, for the stoppage of the hemorrhage, an apparatus, that is at once simple, ingenious, and effectual. The surgeon is to get a piece of birch, and cut it through below the place, where two branches of equal size unite. It is to be made to resemble a sort of fork, the prongs of which are to be about eight lines long, and the handle four. It is then to be covered all over with linen, and put under the tongue, in such a way, that the end of the handle is to rest against the middle of the concavity of the arch of the jaw, while the prongs embrace the frænum, and compress the bleeding vessels. The middle of a roller is next to be applied to the dorsum of the tongue, as far back as possible, and the ends, after crossing each other under the chin, are to be pinned to the child's nightcap. In this manner, the vessels are compressed, from below upward by the prongs of the wooden fork, while the bandage makes pressure from above downward. Thus the tongue is fixed, and the bleeding is effectually stopped.*

CHAP. XXIX.

INJURIES AND DISEASES OF THE TONGUE.

WOUNDS.

WOUNDS of the tongue may be divided into longitudinal and transverse. The former rarely happen, and seldom demand any but ordinary treatment. The same may be said of punctured wounds of this organ; cases, which are occasionally met with in practice.

The most frequent wounds of the tongue are those, which are transverse. They are hardly ever produced by outward means; but, usually, by the teeth, when the lower jaw is forcibly and spasmodically brought against the upper one, while the tongue is out of the mouth, as sometimes happens in epilepsy, and falls upon the chin. In this way, transverse wounds of considerable extent frequently happen, almost separating, in some instances, the apex from the body of the tongue. In such cases, the injury may easily be converted into a sort of cleft, which may remain for ever afterwards, and more or less impede the functions of the organ. This disagreeable consequence is more likely to happen when no care is taken to keep the opposite sides of the wound in proper contact, and hinder them from becoming distant from each other.

Hence, certain writers on surgery have recommended all wounds of the tongue to be immediately closed with a suture; and Richter, though, by no means a constant advocate for this method, is candid enough to allow, that it has succeeded in the best manner, even in cases, where the tongue was nearly bitten through.*

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* See Sabatier's Médécine Opératoire, tom. 3.

The application of a suture to the tongue being attended with some pain and difficulty, a very simple bandage has been proposed for uniting transverse wounds of this part.† Richter maintains, however, that the invention, referred to, does not answer expectation. The main portion of it is a little sort of bag, in which the fore part of the tongue is confined. Thus all motions of this organ forwards, or laterally, may be effectually prevented; but the patient is not deprived of the power of drawing it backward, that very action, which has a direct tendency to make the sides of a transverse wound separate from each other. In some cases, indeed, as Richter observes, the apparatus seems rather to do harm. Children, to whom it proves exceedingly irksome, are made restless by it, so that they keep moving their tongue and jaw about, to the great irritation and disturbance of the wound.

Richter further objects to Pibrac's bandage, that it is decidedly unnecessary; for, such motions of the tongue, as it directly restrains, namely, those forwards, or to either side, may be hindered by applying a bandage to the jaw, and making the patient refrain from talking and mastication. The same author affirms, that such treatment has answered as well as could be desired, in numerous cases, some of which were large transverse wounds in restless and unmanageable children. During the treatment, however, the patient is to be allowed only liquid nourishment, which must be imbibed through a tube.

Perhaps, however, on the whole, the propriety of employing a suture must depend entirely on considerations of the following kind. When the transverse wound is deep and extends quite across the dorsum of the tongue; when it is situated towards the apex, and is conveniently within reach; and when the patient is uncontrollable, and cannot be made to keep the tongue and lower jaw quiet; a suture may be advantageous. On the other hand, when the wound is at the back part of the tongue, (a case by the by that is unfrequent) and a suture must be difficult of application; when the wound is trivial, likely to heal of itself, and there is no risk of its occasioning any material cleft in the part; and when the patient is docile, and attentive to the advice given him; the most judicious practice is to apply such a bandage, as is recommended for the fractured jaw, and to forbid all motion of the tongue and lower jaw, by speaking, masticating, &c. nothing but liquid food being allowed to be drunk through a tube.

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* Richter's Anfansgr. der Wundarzn. band 3, p. 24.

† Pibrac, Mém. de l'Acad. de Chirurg. tom. 9, p. 22, pl. 9.—Le Blanc, Precis d'Opérations.

If the wound should be so deep, as almost to separate the anterior part of the tongue from the rest of this organ, the remaining connexion is not to be divided; but, an endeavour made to bring about an union. There are numerous cases on record, encouraging the practitioner to expect the best consequences from the attempt.*

With regard to other circumstances, relating to wounds of the tongue, the treatment of these cases does not differ from that of wounds in general.

BLEEDING FROM THE TONGUE.

An hemorrhage from the raninal vessels sometimes follows accidental wounds, and surgical operations on the tongue. When it is an artery that bleeds, the accident may prove dangerous, and even fatal, especially in children, who by moving the tongue and jaw about, and continually sucking, promote the hemorrhage, and render the adoption of the measures necessary for its suppression extremely difficult. As, in these cases, a ligature, compression, and styptics, hardly admit of being applied, the bleeding cannot be stopped, without much trouble. Whether the raninal arteries can be tied in a manner suggested in the latter part of this chapter, remains to be proved; but, certainly they are rather too far out of reach to be tied in the common way. Nor can compression, as ordinarily performed, be trusted, sinc eit operates against soft yielding parts, and not upon any fixed point. Strong styptics, even were they deemed worthy of trial, could not well be employed, since they would be apt to mix with the saliva, and be swallowed. Yet, there are some means, by which the most perilous bleedings of this sort have been stopped.

Among the most celebrated of these last methods, is the actual cautery, which is preferred by several of the continental surgeons, and may, perhaps, in this solitary instance, seem almost justifiable to British surgeons, averse as they properly are to this barbarous practice.

Another plan is that of directing an assistant to keep a compress on the bleeding vessels, as long as necessary, with his finger, while, with his thumb, he takes care to make counter-pressure under the jaw. M. Jourdain stopped a considerable hemorrhage from the raninal vessels, by laying a piece of ice under the tongue. The ingenious contrivance of M. Petit for these cases, I have already described in the foregoing chapter.

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* Richter's Anfansgr. der Wandarzneykunst, band. 4, p. 26, edit. 2.

If a surgeon were to be averse to all these plans, or find them unavailing, there is yet one resource left, namely, that of cutting down to, and tying the trunk of the lingual artery, just where it passes over the cornu of the os hyoides.

Hemorrhage from the raninal vessels occasionally arises, quite independently of a wound. In one such example, the bleeding proceeded from a varicose vessel under the tongue, and was effectually stopped with the cautery.*

DANGEROUS ENLARGEMENT OF THE TONGUE FROM INFLAMMATION.

Sometimes, when this organ is inflamed, it swells so prodigiously, that it protrudes between the teeth, entirely fills up the cavity of the mouth, and obstructs speech, deglutition, and even respiration. In such a case, the most prompt assistance is demanded. Ordinary evacuations of blood, and other antiphlogistic measures, here seldom bring relief with sufficient celerity. According to surgical authors, the most certain plan consists in making two longitudinal cuts along the edges of the dorsum of the tongue, from one to two inches in length. A copious bleeding generally follows, which soon brings about a diminution of the swelling. No troublesome consequences are to be apprehended from such incisions, which heal with ease, and scarcely leave any scar behind.†

Jourdain ‡ succeeded in affording prompt relief, by taking blood from one of the raninal veins. This method seems liable to no objection, except that of being, perhaps, difficult, when the tongue is enormously swelled.

In one example, the disease resisted every means, until a blister was applied to the throat.||

Some inflammations of the tongue have been observed to originate from the lodgment of foreign bodies in it, which ought to be extracted; as, for instance, a fish-bone, or a needle.§ Other cases have arisen from the injudicious employment of mercury,

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* See Desault's Journ. de Chirurgie.

† De la Malle, Mém. de l'Acad. de Chir. tom. 5.

‡ Traité des Maladies de la Bouche, &c.

|| Richter's Anfansgr. der Wandarzn. band 4, p. 29.

§ Jourdain, Traité des Maladies de la Bouche, &c.

and the excitement of a sudden and immoderate salivation. Many examples are connected with violent inflammation of the parts about the throat.

Sometimes inflammations of the tongue terminate in suppuration. Such abscesses rarely admit of being opened, and hardly allow the use of any means, except emollient gargles.

Cases have occurred, in which inflammation of the tongue has induced mortification, and the loss of the greater part of this organ. The treatment of such instances must conform to the general rules, delivered in the chapter on mortification.

When, in consequence of any enlargement of the tongue, or other disease in the mouth, the necessary food, and medicines, are, for a considerable time, prevented from being taken, they may be injected into the stomach, through an elastic catheter, which is to be passed through one of the nostrils down the œsophagus. It has been recommended to have the outer end of the instrument to turn upward, out of the nostril, and shaped like a funnel, whereby fluids may be more conveniently introduced;* but, I do not think this any material improvement, since all liquids may be easily injected, with an elastic gum syringe, such as is used for injecting hydroceles, without having the external end of the catheter made in the manner above suggested.

The way of introducing the instrument down the pharynx will be considered in an ensuing chapter.

ULCERS, INDURATIONS, AND TUMORS OF THE TONGUE.

Ulcers on the tongue, of an exceedingly painful, obstinate, and malignant-looking nature, are sometimes produced by the sharp, or rough, edge of a tooth. This mechanical kind of cause is easily detected, on examination with the finger. If the tooth be sound, the projection, or roughness, must be filed off;† if it be carious, the best plan is to extract it. When these objects are accomplished, the sore usually heals, without further trouble.

Some very obstinate ulcers, which originate on the tongue, and are connected with disorder of the digestive organs, may be cured by a long perseverance in the use of the antim. tart. exhibited alternately in small doses, and then in larger ones, so as to excite vomiting.

Ulcers, deserving the epithets *malignant* and *cancerous*, not unfrequently form on the tongue. Sometimes, the malady, in its most incipient state, appears as a sore. Sometimes, a circumscribed moveable, or immoveable, scirrhous swelling is first observable, which gradually becomes painful, and ulcerates. In other instances, there is, in the beginning, only an induration in the substance of the tongue, without the smallest appearance of any swelling. The ulcers, under consideration, are always surrounded by hardness. They may make their first appearance either at the edges, or at the apex of the tongue. In certain cases, the whole, or a large portion, of this organ, is covered with numerous small scirrhous tubercles, which gradually fall into a state of ulceration.* These I have seen greatly diminished by a gentle course of mercury. All the medicines, tried in other cases of cancer, may be exhibited in the present ones; but, on the whole, the timely employment of the knife merits the most confidence.

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* Libouton, Journal de Médecine, tom. 34.

† Videndumque est, nam contra dens aliquis acutior sit, qui sanescere sæpe ulcus eo loco non sinit, ideoque limandus est. Celsus, lib. 6, cap. 12.

However, the following kinds of cases have yielded to particular remedies.

A malignant exceedingly painful ulcer on the tongue, surrounded with a good deal of inflammatory hardness, has been cured by the continued internal use of opium. The dose is to be gradually augmented; patients are stated to have taken, at last, eighteen grains in one day.

One species of malignant ulcer yields to the long continued exhibition of tartar emetic. The doses must be increased, in proportion to the time, which elapses from the first taking of the medicine.†

Very malignant and unyielding sores on the tongue are said to have been cured by repeatedly applying leeches to the under surface of this organ.‡

It would be inexcusable to pass over in silence such ill-conditioned ulcers of the tongue, as originate during violent salivations. Sometimes, similar sores, produced by the same cause, take place, at the same time, on the tonsils; and, in this circumstance, inexperienced surgeons, or mistaken practitioners, who are blinded with the fear of syphilis, are very apt to suppose the sores to be venereal ones. This error leads to the freer use of mercury: the sores frequently slough; and the patient's health becoming greatly deranged, he is thrown into a state of great peril. In this case, it is hardly necessary to observe, that the use of mercury must be immediately omitted, and the mouth very frequently washed with a solution of alum.

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* Richter's Anfangsgr. der Wundarzneykunst, band 4, p. 33.

† Idem, opere cit.

‡ Medical Communications, vol. 2.

Violent inflammations, followed by ulcerations of this sort, are particularly apt to occur when patients, under the influence of mercury, catch cold.

For the removal of a cancerous portion of the tongue, a bistoury is the best instrument; and the patient's mouth should be kept open during the operation, by something interposed between the teeth. The hemorrhage is the circumstance most apprehended; but, we have instances related, of large portions, and even the anterior half of the tongue being amputated, and of the bleeding being easily suppressed, either by the actual cautery, or some of the above named means for the suppression of hemorrhage.* I think a tolerably dexterous man might tie the mouth of an artery in this situation, with the assistance of two pair of forceps to draw the ends of the ligature, when the noose has been put over the tenaculum, round the bleeding point. Certainly, cancerous diseases of the tongue may have advanced to such a degree, that an operation cannot be prudently undertaken. The bleeding would be a serious objection; the whole distemper of the tongue itself might not be removeable; and the contaminated state of the adjacent lymphatic glands, below the jaw, usually existing in this advanced state of the malady, would, according to received opinions, render a radical cure quite impracticable.

When the disease is not in the vicinity of the apex of the tongue, the operator may find it difficult to draw the part sufficiently forwards, and keep it in this position. In this circumstance, surgical authors recommend the employment of a pair of forceps for the purpose, the blades of which are to be covered with rag. Should this instrument be found ineffectual, they advise the surgeon to use a pair of forceps, the blades of which terminate in two short double hooks. As being painful, one should always avoid employing such an instrument, if there is a possibility of dispensing with it.

Here, as in all other cancerous cases, it is the duty of the surgeon to take care, that no point, suspected of participating in the disease, be left behind. Unless this maxim be attended to, the operation will mostly be followed by a relapse.

Abroad, surgeons have sometimes effected a cure by applying the cautery, notwithstanding the wound after the operation had put on an unhealthy and fungous appearance.† In this country, practitioners might hope for similar success from the cautious employment of caustic; for, the revival of the cautery, under any circumstances, is an idea now almost intolerable to every British practitioner.

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* See Mém. Physiologique et Pathologique sur la Langue, par M. Louis, in Mém. de l'Acad. de Chirurgie, tom. 14, edit. 12mo; also Ruysch's Observ. Anat. Chir. obs. 76.

† Journ. de Medecine, tom. 18.

After the excision of a diseased portion of the tongue, local applications cannot be very well used; nor are they in general necessary, when the patient moves the part as little as possible, and avoids putting stimulating food and liquids into his mouth.

Cancerous portions of the tongue may also be extirpated, by passing a double ligature through this organ, and firmly tying one part of the ligature over each side of it.

This plan must be infinitely more painful, than the removal of the diseased part with a knife. To the latter method, the hemorrhage is the only objection, and, notwithstanding all that has been said, I think no surgeon ought to venture to cut away a diseased tongue, without having first made up his mind, respecting what method should be adopted for stopping the bleeding.

When much of the tongue has been lost, there certainly is reason to expect, that its functions will afterwards be performed in a very imperfect manner. However, there are on record several examples, in which the greater part of this organ was lost, and, yet, the patients retained the faculties of tasting, masticating, swallowing, and articulating words, with considerable perfection.*

The removal of scirrhous and sarcomatous tumors of the tongue may be most conveniently accomplished with a scalpel and a tenaculum. Encysted swellings of this organ are generally of the meliceris kind, and ought, if possible, to be dissected out, without opening the cyst at all.†

Authors relate examples, in which the tongue has been of extraordinary magnitude, either in consequence of original malformation, or a peculiar sort of disease. Excepting the deformity, arising from the projection of the part out of the mouth, some of these patients experienced no particular inconvenience, as they could speak, masticate, and swallow tolerably well.‡ Under such circumstances, the removal of the redundant portion would not be advisable; but, if the disfigurement were combined with much inconvenience, the operation would be proper, especially, as the cut part would be so forward in the mouth, that the bleeding vessels could be tied.*

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* See Mém. Physiologique, &c. sur la Langue par M. Louis, in Mém. de l'Acad. de Chirurgie, tom. 14. edit. 12mo.

† Schmucker records the extirpation of a large encysted tumor of the tongue, in which case, the appearance of the swelling had excited suspicions of the patient having two tongues. See Vermischte Chir. Schriften, band 3, p. 322.

‡ Sandifort's Obs.

CHAP. XXX.

DISEASES OF THE TONSILS AND UVULA.

THE tonsils are exceedingly liable to inflame; and, sometimes the swelling, thus produced, is so great as to obstruct deglutition and respiration in a very dangerous degree. Prompt succour is now most urgently required; and relief may commonly be obtained by scarifying the enlarged tonsils, and promoting the bleeding with warm gargles.

This operation may be done with an ordinary lancet, or with a broad one contained in a sheath, and constructed so that its point can only be pushed out to a certain distance. *Pharyngotomus* is the name usually applied to this instrument.† Abscesses in the tonsils are, also, to be opened, when the swelling causes considerable inconvenience.

When scarifications cannot be adopted, the best means are venesection, applying leeches to the throat, exhibiting mercurial medicines, inhaling the steam of hot water, and using proper gargles.

Abscesses of the tonsils have been observed of considerable extent, not bursting in the mouth, as is usual, but in the Eustachian tube, or even the meatus auditorius externus, attended with caries of the mastoid process, deafness, and fistulæ. Such cases are frequently incurable.‡

The tonsils sometimes become enlarged, without being inflamed. This swelling is improperly termed *scirrhus*. The glands are only swollen, and of moderate firmness. A portion of a tonsil, thus enlarged, may be cut off, without the least danger of the rest assuming a malignant nature. This preternatural swelling of the tonsils is mostly owing to repeated inflammations. Sometimes, there is no palpable cause. The malady is constantly free from pain. When the tumefaction is considerable, it obstructs the speech, deglutition, and respiration.

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* Richter's Anfansgr. der Wundarzneykunst, loco cit.

† A representation of it may be seen in Heister's Institut. tab. 21, fig. 6.

‡ Petit, Traité des Maladies Chirurg.

Discutient and astringent applications here prove ineffectual. The tumor admits of being removed; but, it is unnecessary and improper to take away the whole tonsil, as a dangerous and even fatal hemorrhage might be the consequence.* Only so much of the swelling should be removed, as is sufficient to afford relief. The remaining portion in general heals, without the least difficulty: a clear proof that the disease is not of a malignant, nor cancerous nature.†

The extirpation of a part of a tonsil, thus diseased, has been accomplished with caustics, the actual cautery, the ligature, and cutting instruments. The first of these plans was successfully practised by Wiseman; but, is now quite abandoned. The second is, also, relinquished, as no modern surgeons employ it, except now and then, with a view of destroying fungous excrescences, which, in a few instances, originate after a part of the tumor has been removed by some other operation.

A variety of instruments have been devised for putting a ligature round diseased tonsils.‡

There are very good surgeons, who still prefer tying diseased tonsils to cutting them away, and the mode to be adopted differs according as the swelling has a narrow, or broad base. The ligature ought to be made of silver wire, or catgut. When the tumor has a narrow neck, the ligature is to be doubled, and introduced through the nostril, so that the noose may be seen in the throat. With the aid of a pair of forceps, the noose may then be easily placed round the neck of the tumor. The ends of the ligature are then to be brought through a double cannula, and the latter instrument introduced as far as the tonsil. The ligature on each side is then to be drawn tightly, and fastened round rings at the end of the cannula. The instrument may next be twisted, till a due degree of constriction is produced.

Desault employed an instrument, called a *serre-nœud*, for putting the noose of the ligature over a diseased tonsil, and producing the necessary degree of constriction. The *serre-nœud* was nothing more, than a little ring, mounted on a longitudinal, narrow piece of steel,* about five inches long, the other end of which was grooved, or rather forked. The diseased tonsil was first taken hold of with a double hook. With the ring, the noose was conducted along the hook, and put over the tonsil; the ligature was then drawn out, while the ring pressed the noose downward and backward. Thus the due constriction was made, and it was next maintained by twisting the ends of the ligature round the forked extremity of the instrument, on the outside of the mouth.†

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* Mr. Sharp states, that in the manner in which tonsils were formerly cut away, the almost constant consequence was a violent bleeding, and sometimes a mortal one. Op. of Surgery, chap. 32.

† Richter's Anfansgr. der Wundarzneykunst, band 4, p. 46.

‡ See Sharp's Treatise of the Operations, tab. 12, Le Dran's Operations of Surgery, tab. 9, p. 453.

When the disease had a broad base, and was of a conical shape, so that the ligature was apt to slip off, Cheselden has recommended the use of an instrument, like a crooked needle, set in a handle, with an eye near the point, threaded with a ligature, which is to be thrust through the bottom of the gland, and laid hold of with a hook. The needle is then to be withdrawn. The double ligature is next to be brought forwards, and one part tied above, the other below the tumor. The ligatures are now to be cut off near the knots.‡

I have already observed, that the removal of the whole enlarged tonsil is unnecessary, and therefore injudicious. I may now notice, that a *portion* of the tumor may be cut away, without any just ground for fearing a dangerous bleeding. The application of a ligature occasionally produces a most perilous swelling of the diseased tonsil, attended with such hazard of suffocation, as to compel the surgeon to cut and remove it.|| Bertrandi,§ and many other eminent surgeons, have been in the habit of cutting away enlarged tonsils, without ever meeting with an instance of danger from the subsequent bleeding.

Desault sometimes employed a flat sheath, made of silver, and having a notch in it for the reception of the base of the tonsil.

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* The first instrument of this kind appears to have been the invention of Mr. Cheselden, who, in his time, was the glory of English surgery.

† Œuvres de Desault par Bichat, tom. 2, p. 233.

‡ Sharp's Operations, chap. 32.

|| See Obs sur la Rescission des Amygdales tumefiés, par M. Moscati, in Mém. de l'Acad. de Chir. tom. 14, p. 296, edit. in 12mo.

§ "Je me suis convaincu, par ma propre expérience, qu'il est moins douloureux et beaucoup plus expéditif de les extirper avec le fer : je n'ai jamais vu arriver l'hémorrhagie, dont quelques-uns paroissent avoir eu tant de peur." Traité des Operations de Chirurgie, chap. 18, p. 371.

The latter part being thus taken hold of, a spring was touched, when a concealed blade immediately moved across the notch, and made the requisite division, without any risk of injuring the adjacent parts in the mouth.*

The operation may be done with a pair of scissars, constructed with short blades and long handles; or it may be performed with a bistoury, which, in general, must be the best instrument.

The hemorrhage may usually be stopped by washing the mouth repeatedly with very cold water.

When the enlargement of the tonsil is really of a scirrhous nature, a case, which is possible, though not common, an operation, performed so as to remove only a part of the indurated enlargement, would not be followed by success.†

Calculous concretions have been known to form in the tonsils, and occasion troublesome coughing, sore throats, &c. The propriety of extracting them, when their existence is clearly ascertained, is almost too obvious to require being mentioned.

EXTIRPATION OF A PART OF THE UVULA.

When the uvula is permanently elongated, so as to interrupt swallowing, and occasion uneasiness in the throat, coughing, vomiting, &c. it is proper to remove the redundant part.

Slight relaxations of the uvula may generally be cured by astringent gargles, composed of the infusion of roses, alum, tincture of bark, &c. When the inconvenience is not removed by such means, the superfluous portion of the uvula must be cut off with a pair of sharp scissars.‡ The fear of hemorrhage, and the recommendation of the ligature in these cases, still introduced in many modern surgical books, are almost absurd.

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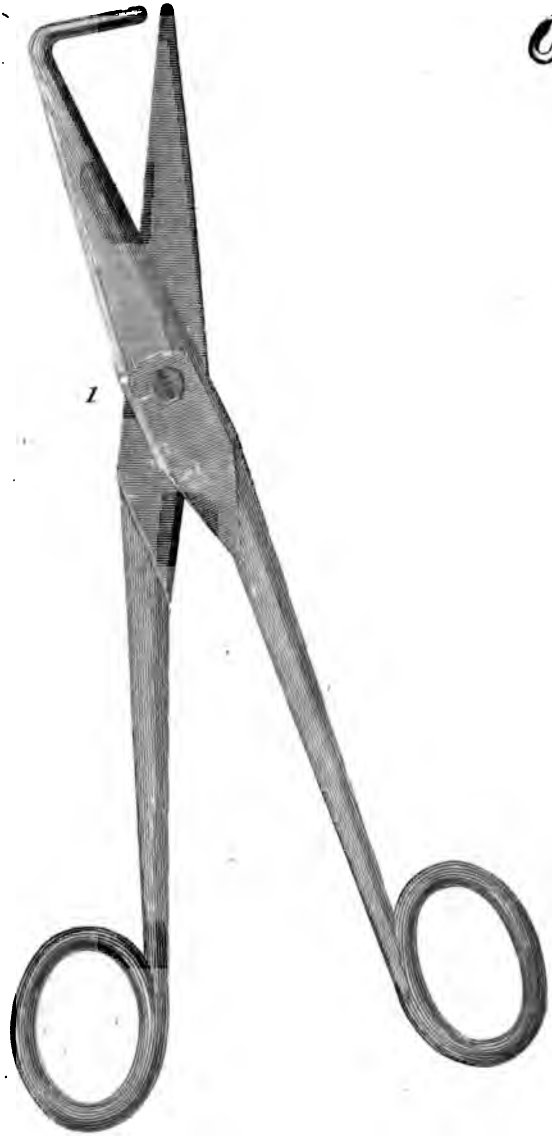
* Op. supra cit. p. 228.

† There are some modern surgical writers, who deny altogether, that the tonsils are ever in reality affected with scirrhus. "C'est à tort qu'on a donné le nom de squirres à ces obstructions muqueuses des amygdales. Jamais elles ne dégénèrent spontanément en cancer. Ce genre d'altération n'y survient jamais, malgré l'application imprudente et réitérée des caustiques. Le succès de l'opération, dans laquelle on enlève seulement une portion des corps glanduleux, prouve assez que leur engorgement n'a point le caractère d'un véritable squirre, &c. Richerand, Nosographie Chirurg. tom. 3, p. 295, edit. 2.

‡ A pair of scissars, constructed like those represented in plate 7, fig. 1, seem well adapted to this operation, as the transverse extremity of one of the blades can be put behind the uvula, and will prevent its slipping away, without being completely divided.

Plate VII.



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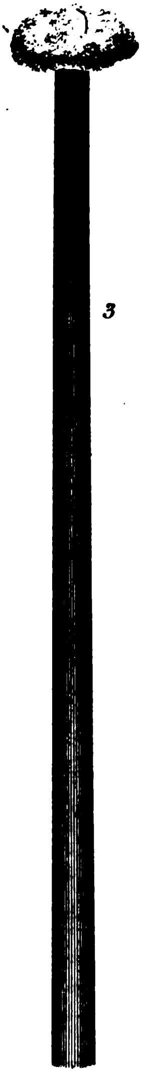

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Published April 2, 1807 by R. Phillips, Bridge Street, Blackfriars, London

Cooper sculp^{t}

CHAP. XXXI.

WOUNDS OF THE NECK.

WOUNDS, in which only the skin and muscles are concerned, require the same kind of treatment, as similar wounds in other situations.

WOUNDS OF THE CAROTID ARTERY; INTERNAL JUGULAR VEIN, &c.

These commonly prove immediately fatal, from loss of blood, before any assistance can be obtained. If a surgeon should arrive in time to render aid, it would be his duty immediately to apply a ligature, both below and above the wound of the vessel. This is the only plan, which affords any chance of saving the patient's life. In passing the ligatures beneath the vessel, great caution is requisite; for, the eighth pair of nerves lie close to it, included in the same sheath of cellular substance. The situation of this nerve is on the outside of the artery, between it and the jugular vein. Including it in a ligature with the artery would alone be an adequate cause of death.

Whether suddenly tying the trunk of the carotid artery would produce any bad effect on the brain, was, until lately, a matter of doubt among many practitioners. Now, however, the recent operations of tying the carotid artery, in cases of aneurism, as performed by Mr. A. Cooper, have shewn, that no disorder of the intellects arises from such a cause, and that carotid aneurisms may be cured, as well as others.*

I have seen the carotid artery tied by Mr. Abernethy in a remarkable case, which that gentleman has related in a publication,† to which I beg leave to refer the reader.

No apparent derangement in the functions of the brain ensued for several hours after the ligature was applied. But, the patient afterwards relapsed into a state, similar to that of a person who has suffered concussion of the brain, and he died on the following morning. However, in the case, there were particular circumstances, from which different persons might draw different conclusions, with regard to the cause of the brain being affected.

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* See the chap. on Aneurisms. † Surgical Observations, 1804.

The narrative of the case, in Mr Abernethy's own words, is highly deserving of attention.

This excellent surgeon recommends, as I have mentioned in the chapter on aneurisms, a very safe method of passing a ligature beneath the trunk of the carotid, in case of necessity. An incision is to be made on that side of the artery, which is next to the trachea, where no important parts can be injured, and where the finger can be introduced under the vessel, so as to compress it. An aneurism needle is then to be passed with a ligature behind the artery, and its eye-part is to be brought up as close as possible to that edge of the vessel, which is next to the internal jugular vein. In this way, there can be no risk of wounding the latter considerable vessel, nor of tying the eighth pair of nerves.

The primary branches of the external carotid, viz. the external maxillary, the lingual, and the thyroideal arteries, are the most frequently injured in wounds of the neck. Persons, who attempt to commit suicide, usually make their incision too high to endanger the carotid artery.

Large wounds of the internal jugular veins generally prove immediately fatal, by reason of the profuse hemorrhage. Were a surgeon to arrive in time to render assistance, he should make pressure above the opening in the vessel, dilate the wound of the integuments upwards, and tie the vein above the place, where it is injured. Care must be taken not to include the par vagum in the ligature. According to Richter, the internal jugular vein has actually been tied in this manner with success. Small wounds of the same vessel, if we are to credit the accounts of this author, may sometimes be healed by means of a graduated compress, which must be retained on the part with a bandage, or, if that prove irksome, with the finger. One thing, however, is essential; namely, the pressure must on no account be remitted, until the wound in the vessel is closed.[*]

WOUNDS OF THE TRACHEA.

Wounds of that part of the trachea, which is within the chest, are sometimes followed by emphysema, arising from the diffusion of air, through the adjoining cellular substance. Such wounds are also very dangerous, because they are of the punctured kind, and generally injure other important parts at the same time.

Wounds of the larynx commonly produce more irritation, than those of the trachea. A convulsive cough is particularly often attendant on them. In fact, the larynx is a much more sensible part than the windpipe.

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[*] Richter's Anfangsgr. der Wundarzneykunst, band 4, p. 173.

Wounds above the os hyoides penetrate the mouth, and are usually attended with profuse hemorrhage, while air, saliva, and victuals, are apt to be discharged from them.

In most cases, wounds of the thyroid cartilage heal very favourably, unless other parts of consequence are also injured.

Transverse wounds of the upper part of the trachea generally do well, when only its anterior half is divided. Such injuries generally leave nerves and vessels of consequence untouched. Loss of the voice; the entrance and exit of air through the wound; and sometimes an emphysematous swelling of the integuments; are the speedy consequences of the injury. Wounds of this description, made by gunshot violence, are more dangerous; but, even these not unfrequently terminate well.

Transverse wounds of the trachea, which have not divided it completely through, may, in most instances, be cured by the strict observance of a proper position. By bringing the patient's chin downward and forward to the sternum, and maintaining the head in this posture by the support of pillows, the edges of the wound in the trachea may be placed, and kept in contact, until they have grown together.

The manner, in which sutures aggravate the cough, and inflame the wound, often necessitates the surgeon to withdraw them, when they have been employed. Besides the irritation, which, as extraneous bodies, they create in the trachea, they are, to say the best of them, in general very unnecessary. Nothing prevents a wound of the trachea from uniting more, than the disturbance of a convulsive cough; and the irritation of sutures always increases this hurtful symptom in a much greater degree, than they do good, by maintaining the edges of the wound in contact. In fact, unless the greatest part of the trachea is divided, there never can be such a space between the edges of the wound, that they cannot be brought into contact by the assistance of a proper posture.

When the troublesome cough seems to be owing to an inflammatory state of the wound, the complaint may be mitigated by bleeding and soothing remedies. In cases, in which, there does not appear to be any particular local irritation to account for the violent coughing, the almond emulsion, spermaceti mixture, and opium, may be given with beneficial effect.

To prevent the entrance of the discharge and blood into the trachea, it has been directed to make the patient lie on his side instead of his back. However, nothing prevents these occurrences more, than keeping the edges of the wound accurately in contact, and the patient's head may be much more steadily supported forward, when he lies on his back, than when he is on his side.

The hoarseness and weakness of the voice, sometimes remaining after the wound is healed, often disappear in a gradual manner.

Many surgical writers recommend the patient to refrain from making forcible expirations, and drawing his head suddenly backward, for a certain time after the wound is healed. By such causes, it is asserted, the recent coalescence of the wound may be easily destroyed.

When a wound has detached the upper portion of the trachea from the lower one, and it is not immediately fatal by the injury of other important parts, the bleeding vessels are first to be tied, and the two ends are then to be brought into contact. In this sort of case, I think, that the employment of a suture is warrantable, on account of the immense separation of the divided parts, and the inefficacy of position alone to prevent it. A flat broadish ligature should be employed, and the needle should not be introduced through the lining of the trachea. One stitch is quite enough, when the chin is kept properly approximated to the breast.

Wounds, made with bullets, which strike the side of the neck, and lacerate the trachea, have frequently been observed to terminate well.* M. Ravaton mentions instances, which were also followed by a recovery of the voice.

Sutures are not applicable to these cases. A strict adoption of the position recommended above, and the application of an emollient poultice, contained in a fine linen bag, are the chief local chirurgical measures. Bleeding, and antiphlogistic remedies of every description will also be generally proper.

WOUNDS OF THE ŒSOPHAGUS.

A total division of the œsophagus may be considered as fatal. The inevitable injury of other important parts, at the same time, would render such a case at once mortal. The celebrated Prussian surgeon, Schmucker, has treated small wounds of the pharynx, and upper part of the œsophagus with success. Wounds dividing half, or even two-thirds of the tube, are also stated to have been cured.† The possibility and impossibility of a cure must obviously depend on what other parts of consequence are injured.

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* Mém. de l'Acad. de Chirurgie, tom. 1, p. 576, 4to.

† Mém. de l'Acad. de Chirurgie, tom. 3, p. 151, &c. edit. 12mo.

Incised wounds, which divide the front of the œsophagus must derive additional danger from the simultaneous division of the whole circle of the trachea. A punctured wound, penetrating the side of the œsophagus, may not be complicated with injury of the trachea, and, therefore, may not be attended with so much peril. Such stabs, however, though not regularly mortal, are always alarming cases.

When the trachea is at the same time divided, the surgeon may diminish the space, between the edges of the wound in the œsophagus, by approximating the divided portions of the trachea. This effect must result from the manner, in which the posterior part of the windpipe is connected with the œsophagus. But, for this purpose, a suture is only to be used, in such a state of the wounded trachea, as has been already mentioned, and in all other cases, a proper position of the head, and the use of adhesive plaster to the external wound, are the means, with which the surgeon must be content.

In cases of wounds of the œsophagus, it was recommended, as long since as the time of Ravaton, to inject nourishment and medicines into the stomach, through a smooth tube of a suitable size, introduced down the passage. In one case of paralysis of the œsophagus, that occurred in this country, a small fresh eel-skin was passed down this canal, by means of a whalebone probang, in order that nourishment and medicines might be injected into the stomach.* The many cases, however, in which Desault advantageously employed an elastic catheter for the same objects, had a principal influence in establishing the practice. The instrument was introduced through one of the nostrils, and was often left in the œsophagus for several days together.† In a future chapter, I shall have occasion to touch upon this subject again.

A small hollow bougie, or elastic gum catheter, is what is now most commonly preferred.

The great utility of this plan of conveying food into the stomach ought not to be limited to wounds of the œsophagus. As deglutition is necessarily attended with a sudden elevation and depression of the trachea, the bad effect, which it must produce on all considerable wounds of this tube, is obvious, and any means of preventing such disturbance of the injured parts cannot fail to be importantly useful. In fact, it is now well ascertained, that by means of a hollow bougie, or elastic gum catheter, milk, fluid jellies, broths, &c. by way of nourishment, and any requisite medicines, may always be injected down the œsophagus, with the utmost ease and convenience.

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* Hunter, in Trans. of a Society for the Improvement of Med. and Chirurgical Knowledge.

† See the Journ. de Chir. and Bichat's Œuvres, Chir. de Desault, tom. 2.

CHAP. XXXII.

FOREIGN BODIES IN THE ŒSOPHAGUS.

FOREIGN bodies which ought to be extracted from the œsophagus, when possible, are such as might create bad symptoms, if pushed downward into the stomach, in consequence of their hardness, indissolubility, pointed angular shape, or other hurtful qualities. Such foreign bodies, on the other hand, as will produce no harm, when in the alimentary canal, and are capable of being digested, may be at once pushed down into the stomach.

Foreign bodies most frequently lodge about the upper, or lower, orifice of the œsophagus; seldom in the middle portion of this tube. When they are low down, the surgeon is often obliged, contrarily to his wishes, to force them into the stomach, even though they are of such a quality, that their extraction would be very desirable. The foreign body is mostly situated above in the pharynx. Hence, it is an important rule, always to press down the tongue, and examine the back of the throat, before doing any thing else. Thus substances may frequently be discovered, and extracted with the fingers, or forceps, when, from the patient's account, one would conjecture, that they had descended much further.

Substances, which lodge in consequence of their size, cannot easily be extracted, because they fill the whole diameter of the œsophagus, and prevent the introduction of any instrument. Though, in the majority of cases, it is far better to extract, than push down extraneous substances, of what kind soever they may be; yet, it is commonly much more difficult, and the surgeon is often necessitated to follow the latter method.

When a foreign body is situated about the upper orifice of the œsophagus, it may be very often felt with the surgeon's finger, and, if incapable of being removed in this manner, it may commonly be extracted by means of a pair of curved forceps.

One of the most common instruments, for extracting things from the œsophagus, is a kind of hook. This is best constructed of strong flexible wire, doubled, and twisted together, in such a manner, that the bent end forms a noose, of the shape of a hook,*

Very small bodies, such as needles, fish-bones, &c. are generally more easily extracted with a piece of sponge, introduced beyond them. The art of employing compressed sponge, in the most advantageous manner, consists in taking a piece about the size of a cheanut, and introducing each end of a strong ligature through it. The ends of the ligature are then to be passed through a tube,† and fastened to that end of the instrument, which the surgeon holds. The sponge is then to be introduced down the œsophagus beyond the foreign body, and water is to be injected through the tube, in order to moisten the sponge and make it expand.

After this, the ends of the ligature are to be firmly drawn, for the purpose of pressing the sponge against the extremity of the cannula and making it expand still more. Then the tube is to be withdrawn, together with the sponge, observing to twist the instrument to the right and left, in this part of the operation.

When the foreign substance cannot be extracted with this instrument, a probang may be tried, to the end of which a bunch of thread, doubled so as to make an immense number of nooses, is fastened. Little bodies frequently admit of being entangled, and extracted in this way, when the other one fails.

Some practitioners are in the habit of giving emetics; but, this practice is very improper when the foreign body is angular or pointed, and is seldom of much use in any case, as patients usually make efforts to vomit of their own accord.

When foreign bodies in the œsophagus produce urgent symptoms, and cannot be extracted, it becomes necessary to push the extraneous substances into the stomach, let them be of any kind whatsoever. The surgeon may the more readily adopt this plan, as experience shews, that such bodies, as one would imagine, likely to produce most alarming symptoms, when pushed into the stomach, very often occasion no dangerous symptoms, and even not the smallest inconvenience. A whalebone probang is the common and most convenient instrument for forcing substances down the œsophagus into the stomach.

When foreign bodies in the œsophagus can neither be extracted, nor pushed downward, the consequences are various. Sometimes, the patient is soon suffocated. In other instances, inflammation and sloughing take place in the œsophagus, and occasionally febrile and convulsive symptoms come on. The consequences, however, are not invariably dangerous. Foreign bodies, especially when small and pointed, very frequently excite suppuration, after which they become loose, and are either carried into the stomach, or rejected from the mouth. Sometimes, they make their way towards the surface of the neck, occasioning abscesses there, out of which they may be extracted.

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* Plate 7, fig. 2.

† Plate 7, fig. 3.

In some instances, foreign bodies, especially such as needles, after making their way through the œsophagus, travel a great way about the body, and, at length, make their appearance at the surface of remote parts, behind the ears, at the shoulders, feet, &c. where they occasion an abscess, which leads to their discovery and extraction. Surgical authors have recorded a variety of examples, in which pins and needles, after being swallowed, have continued in the body many years, without making their way outward. In one instance, in particular, a needle which was swallowed, remained in the body eighteen years before it made its appearance externally. During most of the above space, not the slighest inconvenience was experienced.*

I think it superfluous to describe in this work œsophagotomy, an operation, which few would ever venture to perform. By this remark, I do not mean, however, to assert, that a case might not occur, in which a surgeon ought to make the attempt, especially, when the foreign body is large, like an apple, and its situation is not too low down.

CHAP. XXXIII.

OF THE CASES REQUIRING TRACHEOTOMY, OR LARYNGOTOMY; AND OF THOSE, IN WHICH, PERHAPS, THE INTRODUCTION OF A GUM CATHETER MAY SUFFICE.

TRACHEOTOMY, or bronchotomy, consists in making an incision into the trachea; laryngotomy, in cutting into the la-

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See Précis d'Observations sur les Corps Etrangéres Arrètés dans sophage, &c. par M. Hevin, in Mém. de l'Acad. de Chir. 1, 4to.

rynx. These operations are mostly designed for the relief of similar cases, and have each had the sanction of men of eminence conferred upon them. In England, tracheotomy has almost invariably been preferred, and, in Germany, we may notice among its partisans the judicious and experienced Richter. In France, Desault, and the numerous surgeons, who have issued from his school, give a decided preference to laryngotomy.

The cases, for which these operations have been proposed, may be referred to two general classes; first, those, in which the sole indication is to make a passage for the air; secondly, others, in which, besides this object, the surgeon has in view the extraction of a foreign body from the trachea, or larynx, or else has a particular reason for exposing the parietes of these parts.

The first class comprehends submersion; recent suffocation from gases and suspension; different species of angina; tumors formed between the œsophagus and trachea, or in front of the latter; the lodgment of a foreign body in the first of these canals; and, lastly, deep wounds of the neck.

The second class embraces the lodgment of foreign bodies in the larynx or trachea, whether the extraneous substances have entered by a wound, or through the glottis; certain tumors formed in those parts; and, lastly, a caries of the cartilages of the larynx.

With respect to cases, in which the indication is merely to form an artificial opening for the passage of the air, it is to be observed, that, instead of doing this by cutting into the trachea, surgeons have sometimes had recourse to the introduction of a tube down the glottis, which is to be regarded as another means of fulfilling the same design. The practitioners of this country do not appear to have paid so much attention to this subject, as the French have done; nor, are the generality of them at all aware of the interesting views of it, with which the celebrated Desault presented his countrymen.

With the assistance of the illustrious Bichat, I shall therefore attempt to supply this deficiency. In this chapter, I shall endeavour to determine the cases, which require an incision to be practised in the air tubes, and to point out those, in which the necessity for this operation might perhaps be removed by the use of an elastic catheter. In the next, I shall explain the mode of introducing this instrument, and shew that it admits of being kept in the trachea. And, in another, the best mode of performing laryngotomy and bronchotomy will be considered.

1. FIRST CLASS OF CASES REQUIRING BRONCHOTOMY. SUBMERSION; SUDDEN SUFFOCATION, &C.

There can be no doubt, that, in cases of drowning, suffocation from various gases, and hanging, life ceases principally from the privation of oxygen. When, therefore, in any of these cases, animation has not been suspended so long as to destroy all hope, one of the most likely means of restoring the individual, seems to be that of immediately distending the lungs with fresh air. In such examples, it is true, the indication is to make an artificial passage for the air; but, then, as the muscles of inspiration cannot act, they cannot themselves draw the air into the lungs. Hence, the surgeon has to inflate these organs with a pair of bellows, or some other contrivance, doing, as it were, the office of the inspiratory muscles.

Desault appears to have placed little reliance on inflating the lungs, in cases of submersion; and, even admitting the propriety of the measure, he sets down bronchotomy as, by no means, a necessary preliminary step to the introduction of the pipe employed for the purpose, and contends, that the instrument may always be passed into the larynx through the nostrils.*

This eminent surgeon had acquired a facility of introducing an elastic catheter into the trachea, that furnishes abundant proof of his own skill. But, besides the circumstance of that instrument not being the most convenient for the inflation of the lungs, I may object, that the generality of surgeons would lose too much time in effecting its introduction, and, of what importance, a few minutes are, in all cases of suspended animation, is a point, that needs no comment. Even the bellows, furnished with a curved pipe, and intended to be passed into the larynx from the mouth, are rather difficult of introduction, and apt to occasion loss of time. Nor, can this be wondered at, when the manner, in which the top of the larynx is covered by the epiglottis, is considered. I am, therefore, decidedly of opinion, that it is much better to have recourse at once to tracheotomy, as the readiest mode of enabling the surgeon to accomplish the inflation of the lungs.

This practice is highly proper, in conjunction with electricity, the communication of caloric to the body, the application of strong volatiles to the nose, and the injection into the stomach of a warm cordial beverage, such as mulled wine, by means of an elastic catheter passed down the œsophagus.

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* Pelletan observes: "la bronchotomie n'est pas nécessaire pour soffluer de l'air dans les poumons des asphixiés et des enfans nouveaux-nés, qui ne respirent pas, car on peut aisément introduire dans le larynx une canule de gomme élastique; l'absence de toute sensibilité rend cette opération practicable, &c." Clinique Chir. tom. 1, p. 49.

ANGINA.

Most cases of angina are attended with a swelling of the parts about the throat, and so great are sometimes the rapidity and degree of the tumefaction, that the breathing becomes quite interrupted, and bronchotomy is indicated. In order to be able to judge, whether an elastic catheter can here supersede the necessity for the operation, Bichat desires us to remember, that the inflammation may be seated, either in the larynx and trachea, or, else, in the tonsils, soft palate, uvula, and surrounding mucous glands.

If the inflammation is of the first kind, the passages being rendered almost impervious, the introduction of the elastic catheter must be attended with difficulty; and the lining of the trachea being inflamed, the instrument would create excessive irritation. Hence, Desault acknowledged, in this instance, the advantage of bronchotomy.

But, when the inflammation is of the second description, and all communication is nearly intercepted, between the glottis, which is sound, and the opening of the mouth, and there is risk of the passage of the air, through the nostrils, being also obstructed, the case, according to Bichat, is favourable for a trial of the elastic catheter. There is no reason to apprehend irritation of the lining of the larynx, since that membrane is not inflamed, and the passage, behind the tumefied parts, being still pervious, the introduction of the instrument is very practicable. The thing, says Bichat, is the more easy, inasmuch as it should always be attempted before the swelling is too considerable, and the suffocation threatening. In these cases, Desault found it better to introduce the catheter through one of the nostrils.

SWELLING OF THE TONGUE.

In relation to bronchotomy, an enlargement of the tongue ought to be considered, together with the swelling of the tonsils. It may arise from the sting of a venomous animal; it may occur as an effect of fevers; sometimes it originates spontaneously; while, in other instances, it is a consequence of the unskilful employment of mercury. When the respiration is exceedingly obstructed; when the swelling and redness of the countenance indicate the consequent impediment to the circulation; when large and deep scarification, which should always be first practised, have failed in producing relief; and when the symptoms continue to grow worse; the practice of Desault sanctions the introduction of an elastic catheter into the larynx through the nostril. Delay is highly wrong; for, says Bichat, the swelling will extend backward, and the tongue will partly occupy the pharynx, and block up the glottis, so that bronchotomy will then be the only resource. Many examples of a prodigious enlargement of the tongue are recorded by Flegel, Meckern, Lamalle, Louis, and Richter. The affection, however, seldom occurs in the degree, that we have described.

FOREIGN BODIES IN THE ŒSOPHAGUS.

A foreign body, lodged in the pharynx, or œsophagus, pushes forward the posterior membrane of the trachea, and lessens, or even obliterates the diameter of this tube in such a degree, that the patient is threatened with immediate suffocation. In the register of Desault's operations, a case is mentioned, in which a woman swallowed a bone with such voracity, that it lodged in the middle of the pharynx. The patient was directly seized with all the symptoms of suffocation, and died in the course of three minutes. B. Bell notices two other analogous cases. Here, says Bichat, the most urgent indication is to make an artificial passage for respiration, in order that the surgeon may have time to take measures for the extraction of the foreign body. I may observe, however, that this is the first indication only, where the extraneous substance is unquestionably of such figure and size as not to admit of being pushed into the stomach with a probang; for, in other cases, I should contend, that this attempt ought always to be the first proceeding. But, supposing an artificial passage for the air indispensable, ought the practitioner to perform tracheotomy, or endeavour to introduce an elastic catheter into the windpipe? Tracheotomy was done by M. Habicot on a lad, who, for fear of being robbed, swallowed nine pistoles wrapped up in linen.* In similar cases, the practice of Habicot has been imitated by all surgeons. But, though Desault and Bichat are advocates for trying rather what relief may first be obtained by the introduction of an elastic catheter into the windpipe, I think most practitioners will be of a different opinion, except, indeed, where the foreign body has descended so far, that tracheotomy cannot form an effectual passage for the breath. In the first place, the procuring an elastic catheter, and its introduction, would generally occupy too much time, Desault himself, as I have said, had seen a patient die in the short space of three minutes. Secondly; the danger of cutting into the trachea is by no means so great, as Bichat has represented; and, it may be done at once, even with a common pocket knife, if a surgical scalpel is not at hand.

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* See Mém. de l'Acad. de Chir. tom. 3, p. 145, edit. 12mo.

This able writer, however, has given us one very necessary caution, respecting the possibility of thinking foreign bodies to be in the larynx, when, in fact, they are in the œsophagus, as, in each case, the symptoms of suffocation are nearly alike. Hence, before tracheotomy is undertaken, we are advised always first to introduce an instrument down the œsophagus, in order to avoid an error. To this advice, I may add, that, if the foreign body is known to be large, it must be in the œsophagus; if small, it must be in the larynx or trachea, since large substances cannot enter the little opening of the glottis, and small ones, even if they lodged in the œsophagus, would not occasion such pressure on the trachea as to threaten suffocation.

TUMORS IN THE VICINITY OF THE TRACHEA.

When symptoms of suffocation are excited by some kind of tumor betwixt the œsophagus and trachea, Bichat recommends us, before we recur to bronchotomy, to try to overcome the obstacle to respiration by means of an elastic catheter. He compares this case with the retention of urine, caused by a tumor compressing the urethra, as for instance, an enlarged prostrate, where the indication is to introduce a catheter. In this last example, says he, you would not tap the bladder, without previously ascertaining, whether a catheter could not be introduced beyond the obstruction. Why, then, he asks, will you here act on different principles, when the cases are so analogous?

The same indications present themselves in large abscesses about the pharynx, and larynx, unless, besides the formation of a passage for the air, the surgeon may also wish to make an opening into the larynx, with a view of discharging the matter. Then undoubtedly bronchotomy, or, rather, what has been termed, laryngotomy, would be necessary.

Swellings, situated in front of the cartilaginous rings of the trachea, rarely make such pressure on this tube, as to induce a necessity for making an artificial passage for the breath. The reason of this depends, either on there being no resistance anteriorly, so that the swellings extend themselves in that direction, or else on the greater incompressibility of the fore part of the windpipe. Were such a case, however, to happen, and the tumor could not be diminished, or removed, either tracheotomy, or the use of an elastic catheter, as advised by Bichat, would be indispensably necessary for the prolongation of life.

WOUNDS OF THE NECK.

Several practitioners have considered wounds of the fore part of the neck, as demanding the performance of bronchotomy, both because the inclined position, in which the union of such injuries requires the head to be placed, seriously obstructs respiration, and because the same difficulty of breathing results from the considerable tumefaction of the surrounding parts, especially, in gunshot wounds. In these circumstances, it is alleged, that if the trachea be opened, below the injury, the surgeon may conduct the treatment, without any danger from impeded respiration. M. Habicot informs us, that, being called to a young man, who had received twenty wounds in the head, face, neck, arms, chest, &c. he found him in imminent danger of being suffocated, in consequence of the swelling and inflammation about the throat. As the symptoms became worse, he determined to make an opening in the trachea, below the wound which was near the upper part of the larynx. The respiration instantly became easy; the opening was maintained, till the swelling had subsided; and, in three months, the cure was completed.* Many other similar cases are upon record. Here Bichat puts the question, whether bronchotomy, or the introduction of an elastic catheter should be preferred? One plan requires an additional wound to that already existing; the other leaves the parts uninjured, and only causes a momentary irritation. In the first, the edges of the division may swell, and produce suffocation, as the wound above has done; but, in the second, no apprehension of this sort exists. The introduction of the catheter is always practicable; but, bronchotomy is often retarded by hemorrhage from the veins, which occupy the fore part of the neck in the form of a plexus: the surgeon is then embarrassed with the fear of the danger, which may arise from the entrance of the blood into the trachea, and he is perplexed with the peril of the continuance of the impediment to respiration. They, says Bichat, who studied under Desault in 1794, will recollect having seen a child, into whose trachea a bean had fallen, and, in which instance, the first incision was followed by such an effusion of blood, that it was judged necessary to postpone for two hours making the incision in the trachea. In the mean time, the child died. If, observes Bichat, the operation had been continued, the entrance of the blood into the trachea might, perhaps, have suffocated the infant even more quickly.* Besides these reflections, Bichat objects, that, in the event of the swelling, which obstructs the trachea, extending too low, a second opening is impossible, while, on the contrary, the employment of the elastic catheter is applicable to every case, that may present itself.

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* See Mém. de l'Acad. de Chir. tom. 12, p. 241.

The impediment to breathing, perhaps, might sometimes be obviated by introducing a cannula into the wound, as was done by Habicot, in a case, where a ball, after breaking the larynx, and especially, the left portion of the thyroid cartilage, had made its exit below the inferior angle of the scapula. Bichat, however, is inclined to recommend the introduction of an elastic catheter through the natural way, because the cannula, in touching the edges of the wound, causes much irritation, and hinders the cicatrization. Bichat supports his arguments by an appeal to the success, which Desault had in practice with the elastic catheter; and, he asserts, that the method has proved equally successful in the hands of others. In the hospital at Lyons, a soldier, who had attempted to destroy himself, was nourished and enabled to breathe during a fortnight, by the introduction of one elastic catheter into the trachea, and another into the œsophagus.

Sometimes, wounds of the anterior part of the neck, besides dividing the trachea, extend into the œsophagus. The aliment is then apt to insinuate itself into the windwipe, and the patient is in danger of being suffocated. This peril is removed by introducing an elastic catheter far enough down the œsophagus to reach beyond the wound. Should such a case be complicated with the impediment to respiration, depending on tumefaction, we are advised to pass a gum catheter into each nostril: one of these tubes is to be passed into the trachea; the other into the œsophagus.

2. SECOND CLASS OF CASES REQUIRING BRONCHOTOMY.

SUBSTANCES IN THE TRACHEA, OR LARYNX.

In the second class of cases, requiring bronchotomy, are those, in which a substance is lodged in the trachea, or larynx, and others, in which the cartilages of the latter organ are carious. Here bronchotomy is the only resource, since the indication is not simply to form a passage for the air, but, also, to extract the substance, which occasions the obstruction to respiration. Desault, indeed, in one instance, appears to have introduced a gum catheter for the purpose of changing the position of the extraneous body, the flat surface of which lay transversely, and blocked up the glottis. But, though this great surgeon may have had the good fortune to accomplish his design, and to enable the patient to breathe better, until bronchotomy was done; yet, I think this practice neither necessary, nor safe; for, the extraneous substance might be pushed further down into the trachea, whence it could not afterwards be so easily extracted; and bronchotomy is an operation, which, when required at all, should never be delayed.

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* It seems to me extraordinary, that surgeons of such ability should not have tied the divided vessels, and proceeded with the operation. Were this plan adopted, delay could not be urged as an objection to bronchotomy.

The substances, whose presence in the trachea may require the operation, are either formed internally, or are introduced from without. Consequently, this second class of cases may be divided into two kinds, which are essentially different.

EXTRANEOUS SUBSTANCES FORMED IN THE LARYNX, OR TRACHEA.

The first, to which M. Bichat adverts, are portions of lymph, or, as he terms them, mucous congestions, which are the product of various inflammations affecting the membrane of the trachea. They are described, as being ordinarily adherent, though sometimes loose and unconnected. They obstruct the canal, render the breathing difficult, and are accompanied with a rattling in the throat, a hissing noise, local pain, a feeble hoarse voice, and habitual coughing, frequently followed by spitting of blood, and expectoration of flakes of lymph. When such expectoration does not happen, and no means avail in preventing urgent symptoms of suffocation, we are, according to Bichat, to perform bronchotomy. He confesses, that the effect of this operation is always very doubtful, as the lungs are generally affected at the same time, and the patient may die of the latter disease.

Polypi of the larynx, or trachea, are very uncommon; but, there are instances of them on record, and Desault himself met with two cases: one was in a dead subject, that was brought to his amphitheatre; the other was, in a patient, that died suffocated, after being repeatedly threatened with this catastrophe. A third example was also communicated to Desault by a surgeon, with whom he was acquainted. In all these instances, the tumor was of a pyriform shape, and its pedicle was inserted into one of the ventricles of the larynx. A sense of oppression in the part; the respiration free at certain periods, and difficult at others; sometimes imminent danger of suffocation, suddenly produced by an expiration, but dispelled soon afterwards by an inspiration;

are the chief symptoms of the disease, and they are easily comprehended, when we reflect on the moveableness of the tumors, and the facility, with which their situation is changed by the ingress and egress of the air. When they are pushed with too much force, between the edges of the glottis, they become fixed there, and, unless promptly disengaged by a succeeding effort at inspiration, the patient must perish of suffocation, as happened in the case, which fell under the observation of Desault. As these polypous excrescences hardly ever project into the fauces so as to admit of being extracted through the mouth, their extirpation cannot be effected without a previous performance of bronchotomy; for which operation, in fact, there are two indications, namely, that of enabling the patient to breathe, and that of removing the tumor.

EXTRANEOUS SUBSTANCES INTRODUCED INTO THE LARYNX, OR TRACHEA, FROM WITHOUT.

Pointed bodies, which penetrate the trachea by a wound, are sometimes only discoverable externally by a red spot, under which they can be felt. They are apt to give rise to symptoms of suffocation, and should be extracted, without delay, by making a skilful incision. When the extraneous bodies are blunt, and have entered by a largish wound, they will either be expelled by an expiration, or may be taken out with suitable instruments.

Foreign bodies, which have slipped into the larynx, or trachea, through the mouth, present much variety. 1. They differ, in regard to their greatest diameter, which may be from one to eleven or twelve lines. 2. Their shape may be round, flat, or angular. 3. Their nature hard or soft, and susceptible, or insusceptible, of enlargement from moisture. 4. Their outer surface may be smooth, slippery, unequal, or very rough. The symptoms, which may arise, cannot be well understood, unless these varieties are known.

Whatever may be the sort of extraneous substance, its presence in the larynx, or trachea, produces symptoms, which are more or less alarming, and an acquaintance with the whole of which is necessary to an accurate diagnosis. A person has put into his mouth some kind of solid body, which has disappeared; a convulsive cough has immediately taken place, accompanied with a hissing and rattling in the throat; the patient points out the seat of pain with his finger; there is more or less difficulty of deglutition, which is sometimes very painful; a manifest change has occurred in the voice, which is generally hoarse, and may even be entirely impeded; vast difficulty of breathing prevails; in the course of a short time, a serious obstruction in the circulation of the superior vessels is evinced, by the redness of the countenance, prominence of the eyes, and fulness of the jugulars; and, occasionally, a degree of emphysema is apparent above the clavicle. The patient makes great efforts, is much agitated, and has an irregular intermitting pulse.

When uncertainty prevails, respecting whether the foreign body is in the trachea, or œsophagus, a probang should always be immediately passed down the latter canal.

The symptoms do not constantly follow one course. Sometimes they continue, without interruption, in the same degree. Sometimes, they gradually subside altogether, but afterwards return with increased violence. In other examples, they only cease in part, a local pain, an oppression, and a difficulty of swallowing still continuing. In short, they conduct the patient, by a longer or shorter road, to a death, which is almost always inevitable, unless the surgeon interposes his assistance.

This variety in the progress of the symptoms depends very much on the particular situation of the foreign body, which may lie,—1; between the edges of the glottis,—2; in the ventricles of the larynx,—3; free and loose in the trachea,—4; or fixed in some part of this canal.

In the first case, if the opening in the glottis is entirely closed, the symptoms of suffocation come on suddenly, and the patient perishes, unless prompt succour is afforded him. But, if some small space is left for the air, then, he is afflicted with a convulsive cough and local pain, and he points out the seat of the obstruction with his finger. When, in a case of this sort, the foreign body projects into the mouth, its extraction with forceps, or the fingers, should be instantly attempted. But, when it has passed too far down, bronchotomy becomes necessary, not indeed to extract the foreign body through the wound, but, to enable the surgeon to push it up into the mouth again.

The extraneous substance can only lodge in the ventricles of the larynx, when it is of small size. The symptoms at first are then less serious; but, they may afterwards prove fatal. Desault, in his lectures, used to relate a memorable case, in which a cherry-stone, lodged in the larynx, did not kill the patient, till two years had elapsed. Hence, though a foreign body, in the ventricles of the larynx, may only excite occasional symptoms, yet, if the surgeon is certain of the nature of the case, it is his duty to make an opening for the extraction of the extraneous substance.

When the foreign body is loose in the trachea, it ascends in expiration, and descends when the breath is inhaled. At the commencement, the general symptoms occur more or less numerously; the pain is acute; the substance every instant shifts its place; the cough is frequent, and often convulsive, so much so, that the foreign body is thereby sometimes expelled. In this circumstance, it is now and then unconsciously swallowed by the patient, and much astonishment is excited by the sudden and permanent disappearance of the symptoms. But, if the expulsion cannot be effected, and the body is smooth, the canal may become habituated to its presence, and the pain, oppression, cough, and difficulty of breathing, only take place at intervals. In surgical books, cases may be perused, where patients have lived several years with extraneous substances in the trachea.

One would expect, that the weight of the foreign bodies, would carry them into the bronchiæ. The fact, however, is, they have seldom been found in this situation. When an opening is made into the trachea, or larynx, they are almost always on a level with the incision, and are often driven out of it by the force of the breath.

Things are less propitious, when the foreign bodies are unequal and rough. The membrane of the trachea, being then irritated, is apt to swell, lessen the capacity of the canal; and produce a necessity for the prompt execution of the operation. From being at first loose, the extraneous substance may become fixed. This change may also sometimes depend on the soft, spongy quality of the foreign body, which, though originally small, may absorb moisture, and, expanding so as to fill the whole diameter of the tube, may excite pressing symptoms of suffocation. In all such instances, bronchotomy is strongly indicated.

The foreign body may be fixed in some part of the trachea, or larynx, either with its point, or asperity inserted in the membrane, or with its two ends engaged against the sides of the tube. In this case, the pain is in one place; and the ordinary symptoms prevail, modified according as the passage for the air is more or less obstructed. Here Bichat cautions us against falling into the mistake, which was once made by a good surgeon: a patient, after attempting to swallow, was seized with symptoms of suffocation. Bronchotomy was performed; but, as nothing was found in the trachea, it was inferred, that the extraneous substance had descended into the bronchiæ. The patient died; and, the surgeon was surprised to find the foreign body in the œsophagus. This fact shews the prudence of always adopting the preliminary step of introducing an instrument down this last canal, before undertaking bronchotomy.

Fluids in the trachea can never be a reason for the performance of this operation; for, if the organic force is insufficient to expel them through the natural aperture, what can avail an artificial opening in the trachea? The escape of liquids is less easy, than that of solid substances, being blended with mucus and air, and diffused in the bronchiæ and their ramifications.

The last case, which Bichat mentions, as requiring bronchotomy, is a caries of the cartilages of the larynx. The operation is done with a view of exposing the parts, and enabling the surgeon to put a stop to the disease in them. As I am totally unacquainted with this affection, and doubt the propriety of the practice suggested, I shall be content with barely mentioning the subject, and referring such readers, as may wish further information, to Bichat's own account.*

CHAP. XXXIV.

OF THE INTRODUCTION AND KEEPING OF ELASTIC CATHETERS IN THE TRACHEA AND LARYNX.

ENGLISH surgeons have long been familiarized to the practice of introducing gum catheters into the œsophagus, in order to convey nourishment down that tube, in cases of wounds, &c. But, the idea of enabling a patient to breathe, by the introduction of such an instrument into the larynx and trachea from the mouth, when respiration is obstructed by causes already adverted to, seems to have gained in this country little notice, and, perhaps, still less belief.

Several cases,† however, which are recorded by Bichat, incontestably prove, that gum catheters may be kept in the trachea. Hence, as this gentleman has remarked, it is not absolutely necessary to adduce reasoning in support of the method, though, since the practice is so very different from that ordinarily followed, as to excite doubt, he conceives it may not be improper to adduce reason in confirmation of what experience has taught. The following account is given by Bichat of the circumstances, which led Desault to the practice in question.

In cases of inflammatory quinsy, Hippocrates recommends the introduction of a tube into the throat, in order to enable the patient to breathe. This method had few followers amongst the ancients; Asclepiades, and Paulus Ægineta totally abolished it by proposing bronchotomy; and it has been almost forgotten by the moderns, or only mentioned by a few, who have condemned it as impracticable, by reason of the extreme sensibility of the membrane of the trachea. Desault had long entertained a suspicion, that such sensibility might soon be blunted by the presence of a smooth body, to which, at length, it would become habituated. Chance afforded him, one day, a convincing proof of this circumstance. He introduced a gum catheter into the œsophagus of a patient, who had a transverse wound of the neck, in order to inject nourishment into the stomach. A sudden cough was excited by the entrance of the instrument; and the patient, who made efforts to vomit, was not interfered with for a little while. He soon became quiet, and continued so for an hour. At the end of this time, an attempt was made to inject some broth through the catheter. A violent convulsive cough was immediately occasioned; and the introduction of aliment was postponed for two hours longer. During all this time the patient was easy; but, no sooner was a fresh endeavour made to inject the broth, than violent coughing, agitation, and trouble were again produced. Desault, then suspecting, that the catheter was in the larynx, put a lighted candle near the end of the instrument, and the flame was directly blown to one side. The catheter was now withdrawn, and, being placed in the œsophagus, conveyed the broth into the stomach, without the patient being put to any pain.

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* Œuvres Chir. de Desault, tom. 2, p. 262.

† See Obs. 1, 2, 3, &c. Op. cit.

The foregoing mistake, which had lasted three hours, without the patient shewing any signs of pain, was an useful hint to Desault, and obviated, in his mind, all the difficulties depending on the sensibility of the membrane of the trachea; difficulties, which the following reflections, also, tended to dispel.

There is no property, which habit modifies more strikingly, than the sensibility of mucous membranes. Observe a man, who has a catheter passed into the urethra the first time; he experiences a painful sensation; the bladder contracts; he has an inclination to make water; but, let the instrument remain in the passage; its presence soon ceases to be painful; the next day, it is scarcely irksome; the third, it is hardly felt. Let an instrument be passed into the nostrils, in order to put a ligature over a polypus, a sudden irritation of the pituitary membrane; an annoying tickling sensation, and sneezing, are instantly produced. But, if the instrument is left introduced, it soon ceases to incommode the patient. The trachea itself exhibits similar phenomena. If a small, slippery, smooth body has fallen into it, and is fixed in one place, it may continue there, a long while, without producing any symptoms. Even the patient himself may not be aware of its presence. M. Louis, in one instance, neglected to perform bronchotomy, when a bean was in the trachea, because no symptoms existed; and Tulpius, and Bartholine have recorded similar cases. Hence, the conclusion may safely be made, that, the foreign bodies do not occasion the bad symptoms, by being in contact with the membrane of the trachea, but by the irritation of their rough surface, by the way, in which they obstruct the passage of the air, and sometimes by their chemical qualities. The cannulæ, which surgeons introduce into the trachea, after bronchotomy, excite no grievances; and they may be worn two, or three weeks, without any annoyance to the patient.

The inference, drawn by the French surgeons, is, that the sensibility of the lining of the trachea, so manifest on its being first touched by any substance, to which it is not accustomed, becomes gradually blunted and annihilated, when that substance has been, a certain time, in contact with the membrane.

The catheter should, in general, be more flexible, than that used for the urethra, in order that it may accommodate itself to the angles, which it has to make. No substance is so well adapted to this purpose, as elastic gum. The catheter should, also, be twice as long as those designed for the urethra, in order to be calculated for the extent of the passages. Its diameter should equal that of the largest catheters. Nothing is more certain, than that, in general, large instruments of this kind produce less irritation, than such as are small, in regard to the canal, into which they are passed. To one end of the catheter is to be attached a thread, with which the instrument is to be fastened to the patient's cap. The other end is to be constructed with two large lateral apertures, and terminate below in an opening, so as to let the mucus readily escape.

In introducing it, the surgeon is to hold it in the manner of a pen, and push it carefully through one of the nostrils. When it has reached the fauces, it may enter the larynx, or the pharynx. Its entrance into the former may be known, by the painful tickling sensation, which the patient feels; by the sudden coughing, with which he is attacked; by the propensities to vomit, and the spasmodic elevation of the larynx; by the agitation of the flame of a candle, brought near the external opening of the catheter; and by the resistance met with at the bifurcation of the trachea.

On the other hand, if the instrument has descended into the pharynx, less irritation is produced; no coughing is excited;

and the flame of the candle is not disturbed. Nothing stops the passage of the instrument down to the stomach, and this great depth, to which the catheter may be introduced, denotes with certainty, that it is in the œsophagus.

In the last event, the catheter is to be withdrawn; its end is to be inclined more forward; and an endeavour made to get it into the glottis. If the attempt still fails, a curved stilet is to be passed into the catheter, and its concavity is to be turned downwards. The instrument, being now firmer, admits of being directed to the opening better; and, on the outer end being moved upwards, the lower is carried downwards, into the glottis. As soon as the introduction is accomplished, the stilet is to be withdrawn. The catheter is then to be tied to the patient's cap, and its outer opening covered with a piece of gauze, in order to hinder the insinuation of any extraneous substances into the tube.

The length of time, which the instrument is to continue in the part, must be determined by the nature of the cause, requiring its employment. Should it become obstructed with mucus, it must be withdrawn, cleansed, and introduced again.

CHAP. XXXV.

OF LARYNGOTOMY AND BRONCHOTOMY.

WHEN the gum catheter is too annoying, or it becomes continually stopped up with mucus; or, when the nature of the case indispensably requires an artificial opening to be made in the larynx, or trachea, the surgeon should not hesitate to have recourse to the knife.

The operation admits of being done either on the trachea, or the larynx. In the first case, it is called *tracheotomy*, or *bronchotomy*; in the second, *laryngotomy*. The first is generally adopted, and is the only method treated of by Garengeot, Dionis, Bertrandi, Sharp, Heister, B. Bell, M. Louis, &c. The second, which is a practice of recent date, is described only by a few writers. The latter consists either in making a transverse incision through the crico-thyroid membrane, or in slitting open the thyroid cartilage longitudinally; while the former is sometimes executed by making an incision between two of the rings of the trachea parallel to them; sometimes by making a perpendicular division of two or three of them.

Desault, it is well known, was partial to laryngotomy, and he founded his preference on the following considerations. The only parts, interested in the operation, are the skin, cellular substance, and crico-thyroid membrane. But, in tracheotomy, the skin, much cellular membrane, and mostly the thyroid gland are cut. The latter proceeding, however, appears to me easily avoidable. Desault considered laryngotomy as attended with less risk of hemorrhage, a few small veins, and the superior laryngeal artery being alone exposed to the knife. In tracheotomy, the network of the enlarged thyroid veins, and the thyroid arteries, are alledged to be endangered, and then, either the risk of the blood falling into the trachea must be encountered, or the operation be perilously deferred.* The larynx, it is also said, being more easily fixed, than the trachea, may be cut into with less hazard of injuring other parts. But, the trachea, being more deeply situated, and moveable, may slip away from the knife, which may wound even the carotids. An instance, in which such a misfortune happened, is related by Bichat; but, I cannot help thinking, that the operator must have been a true blunderer.

As to the question, which operation is most suited to the objects in view, Bichat endeavours to shew, that laryngotomy always answers as well, and sometimes better than tracheotomy. If the design is merely to make an opening for the air, one situation will do as well as the other. If the extraction of a foreign body is the object, laryngotomy must evidently be the most applicable, supposing the substance to be lodged between the edges of the glottis, or in the ventricles of the larynx.

While Ferrand was surgeon of the Hôtel Dieu, a man was brought thither with urgent symptoms of suffocation, caused by a stone having fallen into the glottis. Tracheotomy was performed; but, only some blood, and mucus were discharged. The patient died, and, on examination, a triangular stone was found, two angles of which were lodged in the ventricles of the larynx, while the other projected at the glottis. No doubt, in this example, laryngotomy would have been the means of saving the man's life.

Supposing the foreign body to be in the trachea, Sabatier advises this canal to be opened; but, according to Bichat, when the substance is loose, it is almost always at the upper part of the passage; and, if it should happen to be fixed and lower down, it might be extracted by extending the cut through the cricoid cartilage, and using a pair of curved forceps.

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* Though I conceive the danger of hemorrhage here exaggerated, if an accident of this kind were to happen, the surgeon should at once tie the vessels.

If the surgeon objects to the employment of a gum catheter, however, in cases of deeply seated tumors between the trachea and œsophagus; a foreign body far down the latter passage; or of obstructed respiration from the tumefaction attending a transverse wound of the neck; tracheotomy is alone applicable.

MANNER OF PERFORMING LARYNGOTOMY FOR THE PURPOSE OF MAKING AN OPENING FOR THE AIR.

When this is the only object, a transverse incision in the crico-thyroid membrane will suffice. The instruments necessary are a common scapel, and a flat silver cannula, about an inch long, having at its sides two rings furnished with riband, being open at each end, and having laterally at one of its extremities two slits, which will serve as a passage for the air, in case the instrument should come into contact with the opposite side of the trachea.

The skin being made tense, and the larynx fixed, the skin and cellular substance are to be divided, to the extent of an inch, from the lower part of the thyroid to the cricoid cartilage, between the sterno-thyroidei, and hyoidei muscles. The surgeon is then to place on the membrane his finger, with which he is to guide the point of the knife. The puncture should be made rather towards the cricoid cartilage, in order to avoid an arterial branch, which usually runs along the lower edge of the thyroid cartilage. Should any vessel happen to bleed, it must be tied. Lastly, the silver tube is to be introduced, and, being covered with a bit of gauze, is to be fixed in its place with ribands. Care must be taken to withdraw and clean the cannula, as often as it may become obstructed with mucus, during the necessity for continuing its employment.

LARYNGOTOMY FOR THE EXTRACTION OF FOREIGN BODIES, AND POLYPI.

A scalpel, a director, a straight, and a curved pair of forceps, are the requisite instruments. A cannula may be necessary, in the case of a polypus. The skin and cellular substance are first to be divided, from the upper part of the thyroid to the base of the cricoid cartilage. The membrane, between these two parts is to be opened; and, a director being passed into the aperture, the thyroid cartilage is to be slit open its whole anterior extent. On the edges of the wound being now separated a little with the straight forceps, the foreign body, if it is loose, will immediately escape with the air. Should it be fixed, it must be taken out with the curved forceps. In case it is engaged in the glottis, it is most convenient to push it upwards into the mouth. When it has passed far into the trachea, the extraction may be difficult, unless the wound be enlarged by dividing the cricoid cartilage. Supposing the extraneous to be a polypus, the tumor must be twisted off, and extracted, with a pair of forceps. In this last case, the introduction of a silver cannula, after the operation, is advised, in order to hinder the breathing from becoming obstructed by the inflammation and swelling of the membrane of the larynx, and to afford a vent for the discharge.*

In old persons, there may be some difficulty in dividing the larynx, owing to the ossification of the cartilages.

The latter way of performing laryngotomy would be necessary, were the surgeon about to inflate the lungs, as the opening in the first method would not be sufficiently large for the entrance of the muzzle of a pair of bellows.

MANNER OF PERFORMING TRACHEOTOMY, OR BRONCHOTOMY.

The practitioners of this country have generally chosen this operation, though the prudence of the choice is not altogether manifest, except in certain cases already alluded to in the present chapter.

The following is the mode of operating, as ordinarily practised:

When a free incision into the trachea is requisite, the surgeon may make an incision in the integuments, which should begin just below the inferior lobes of the thyroid gland, and be carried straight downwards about two inches. The sterno-thyroidei muscles are then to be pushed a little towards the side of the neck, and a longitudinal wound, of the necessary size, is next to be made in the front of the trachea. The knife must not be carried either to the right or left hand, in order to avoid all risk of injuring the large blood-vessels, and the incision ought never to extend too near the first bone of the sternum, lest the subclavian vein should unfortunately be cut.

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* I am indebted to Bichat for the most interesting observations in the two preceding chapters, as well as a part of the present. See Œuvres Chir. de Desault, tom. 2, sect. 2. The reader will also find much information on the subject in the papers of Louis, Mém. de l'Acad. de Chir. tom. 4 and 5, 4to., and in Pelletan's Clinique Chirurg. tom. 1.

Supposing the object of the operation is merely to make a passage for the air, a smaller incision both in the skin and trachea will suffice.

CHAP. XXXVI.

OF THE CASES IMPEDING DEGLUTITION, AND OF THE USE OF ELASTIC GUM CATHETERS, IN THEM.

A VARIETY of causes may produce an impossibility of swallowing. Some are the result of the action of external bodies, as, for instance, incised, and contused wounds of the passages, through which the aliment is naturally conveyed into the stomach. Others are the consequence of internal affections, as various tumors in those passages, strictures of the œsophagus, and paralysis, and spasm of the muscles of the latter part, &c.

1. It is not an uncommon thing for persons, who attempt suicide, to discharge a pistol into their mouths, under the idea, that a quick and certain death must follow. Experience proves, however, that the horrid design frequently fails. It is true, vast injury is the effect of the wound; yet, the patient often recovers, and, if he becomes a victim, it is not till after lingering some time. Among the causes, which, in such a case, may operate in putting a period to life, is an impossibility of deglutition. The soft parts of the mouth, being grievously contused and lacerated, are affected with enormous swelling, and, consequently, the passage from the mouth into the pharynx is quite obstructed. Even when the tumefaction is not considerable enough of itself to produce a total impediment to deglutition, this serious affection may be caused by the paralysis of the muscles of the pharynx, occasioned by the violent concussion, to which they have been subjected. It is hardly necessary to state, that, in all such cases, the patient would mostly perish, if no means of conveying aliment and medicines into the stomach were devised. Such means, however, we fortunately possess in the elastic gum catheter, which is to be passed from the nose down the œsophagus. In 1789, Desault was called to a young man, who had discharged a pistol, loaded with three bullets, into his mouth. A part of his tongue was shot away; his jaw was fractured; and the roof of his mouth broken to pieces. A prodigious degree of swelling quickly ensued. On the third day,

nothing could pass into the stomach, and, no doubt, had not an elastic catheter been used, the patient's death would have been inevitable. With the assistance of this instrument, a recovery was speedily effected.

2. Incised wounds of the neck, either above the os hyoides, betwixt this bone and the thyroid cartilage, or below the larynx, may interest the pharynx, after dividing the organs, situated in front of it. Such an accident may become complicated with tumefaction, so as to be attended with the same sort of impediment to deglutition as accompanied the preceding case; or, if such swelling should not occur, the wound in the pharynx may let the victuals fall into the larynx, and trachea. The consequences are most violent coughing, danger of suffocation, and such loss of strength, as tends to a fatal termination.

3. In the second class of obstacles to deglutition are to be arranged: 1. Excessive enlargements of the tonsils, either acute, or chronic. 2. A considerable swelling of the tongue, completely closing the passage from the mouth into the fauces. 3. Tumors in the course of the œsophagus, and dangerously compressing it. Of this nature, are abscesses, betwixt the latter tube and the trachea. 4. Inflammation of the pharynx, which affection either prevents deglutition by the tumefaction excited, or else by hindering the contraction of the muscles; just as we find the inflamed bladder cannot expel the urine. 5. Strictures of the œsophagus. 6. Tetanus is also mentioned by Bichat, the case being attended with such a spasm of the masseter, that the lower jaw cannot be at all depressed. In a former chapter, however, I have related, that M. Larrey, in Egypt, as well as my friend Mr. C. W. Cruttwell, of Bath, found, that the elastic gum catheter could not be passed down the œsophagus, in tetanic cases, owing to the violent paroxysms of spasm, and sense of suffocation, induced by the attempt. 7. Spasmodic contraction of the muscles of the pharynx. 8. Lastly; atony of the same organs.

MODE OF GIVING NOURISHMENT, &C. IN SUCH CASES.

Death must happen, when the foregoing obstacles to deglutition prevail too long; and, if the surgeon cannot effect a timely removal of them, it is his duty to have recourse to some palliative plan, in order to maintain life, while he endeavours to obviate, by methodical means, the causes, which threaten the patient with so much danger. The palliative means are of two kinds: 1. Nourishing clysters: 2. The introduction of liquid food, through the nostrils, or mouth, by an artificial contrivance.

The inutility of nourishing clysters is at present generally acknowledged. The lacteals, which decrease in number, in proportion as the intestinal canal approaches its termination, cannot take up an adequate supply of nourishment, and the patient, if not supported by other means, must soon die.

Whatever artificial means be employed, the introduction of liquid food, through the mouth, is almost always impracticable. The organs of this cavity, indeed, are usually the seat of the obstruction, which it is either dangerous, or impossible to remove. The surgeon has it not in his power to choose this way, in enlargements of the tongue, tonsils, or soft palate, or in gunshot wounds of the mouth, &c. In fact, he can choose this method in few instances, except wounds of the lower part of the neck, or tumors in the course of the œsophagus.

The nostrils generally present a much more ready passage. Being alway pervious, the fluid aliment may be transmitted through them into the pharynx, which is itself generally free, at the back of the obstruction, as, for instance, an enlarged tongue, or tonsil.

In the cases, under consideration, elastic gum catheters are highly convenient, as, when empty, they are quite flexible, and, when filled with the stilet, they are tolerably firm. The latter quality renders them easy of introduction; the former makes their presence in the œsophagus unattended with uneasiness to the patient. Desault was constantly in the habit of employing them; their length was proportionate to the extent of the passages, into which they were to be introduced; and their diameter was equal to that of the largest urethral catheters.

Here I may remark, that, in a case of stricture of the œsophagus, it be necessary to employ a catheter of less size. In a case related by Bichat, Boyer was not able to get a gum catheter beyond the stricture, before he had forced a silver catheter through the obstruction. The latter instrument was passed from the mouth.

When the gum catheter is to be passed from one of the nostrils down the œsophagus, it is to be armed with the stilet, and moderately bent, in the form of an urethral catheter. It is to be held like a pen, and passed through the nostril, with the concavity turned downwards. It is to be pushed on slowly; drawn back, when impeded by any obstacle; and then pushed on again, until its end reaches about the middle of the pharynx. The surgeon, is now, with one hand, to withdraw the stilet, while, with the other, he pushes the tube further down the œsophagus. Should the catheter enter the larynx, which sometimes happens, and which may be known by the pain, violent coughing, stoppage of the instrument, &c., it is immediately to be drawn back, and its introduction attempted again.

When the surgeon is sure, that the gum catheter is properly introduced, its outer end is to have a piece of thread, attached to it, the extremities of which are to be wound round pins in the patient's cap.

With a syringe, the surgeon can now inject either liquid food, or medicines into the stomach.

The catheter is to be kept introduced, until the obstacles to deglutition are removed.

In the example quoted above, where Boyer could not get a gum catheter through the stricture, until he had passed a silver one through it, the introduction of the former instrument through the nostrils was found quite impracticable. But, as it was an object of importance to fix the outer end of the catheter in the nose, so that the instrument might be kept conveniently introduced, Boyer accomplished his wish, by first conveying one end of a ligature through the nostril to the fauces with a probe, whence it was drawn out of the mouth with a pair of forceps. The upper part of the catheter was then fastened to this end of the ligature; and the instrument was pushed, from the mouth down the œsophagus, until its upper end alone remained visible at the back of the mouth. With the extremity of the ligature, the upper portion of the catheter was then drawn from the fauces out of the nostril, and fixed there.*

CHAP. XXXVII.

WRY NECK.

IN this complaint, the head is drawn towards one of the shoulders. In general, the face is turned towards the opposite side; but, occasionally, towards that, to which the head inclines. The affection, when in a high degree, renders the head quite immoveable, so that neither the patient, nor any other person, can place it in its proper position. Hence, when the patient wishes to look in any other direction, than immediately before him, he is necessitated to turn his whole body. Sometimes, the head can be moved, but not brought into a straight posture. In other instances, the patient, with exertion, can manage to keep his head straight for a short time; but, it soon becomes again inclined towards the shoulder.

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* For the valuable matter in this chapter, I am indebted to a Mémoire sur les Moyens de Nourrir les Malades chez lesquels la déglutition est empêchée. Œuvres Chir. de Desault, par Bichat, tom. 2, p. 282, &c.

The complaint is usually owing to a defect in the muscles, concerned in moving the head. When, however, the deformity has existed a very long time, and, particularly, when it has begun in an early period of childhood, and has continued during the growth of the body; the cervical vertebræ either assume a preternatural formation, or become anchylosed, in which circumstances, the case is, for the most part, totally incurable. This participation of the vertebræ in the disorder, however, does not always exist, even though the deformity may have begun at an early period of life, and prevailed a considerable time.

Richter makes mention of several German surgeons, who have successfully operated for wry necks under the most unpromising circumstances; the head being quite immoveable, the disease having existed from twelve to sixteen years, and had its commencement in infancy.*

The malady may originate from a mere contraction of the integuments on one side of the neck. This cause is easily detected by the presence of a scar on the skin. Most surgeons are aware of burns, and sores in the neck, being sometimes followed by the deformity under consideration.

In this kind of case, the cure is not so easy to accomplish, as many might imagine. A transverse incision is made through the integuments, and the head is afterwards kept in a straight posture by some mechanical contrivance, until the wound is perfectly healed. There is said to be an advantage in dividing the skin high up in the neck; and the wound should go quite through, or it will be of no service. It must be confessed, that the benefit, resulting from this operation, is, for the most part, only a temporary one. The operator ought to avoid cutting the external jugular veins. After making a small wound through the skin, it is best to enlarge it to the necessary extent, by means of a blunt-pointed curved bistoury.

The wry neck is sometimes accompanied with an induration and contraction of the muscles on the side of the neck. The affected side is often somewhat painful. Frequently, an induration, of considerable extent, is externally perceptible.

The cure of this case is very imperfectly understood. The usual means, which sometimes succeed, are camphorated mercurial frictions on the part, even till salivation occurs; the internal exhibition of opium, together with mercurial frictions; electricity; stimulating embrocations; the shower-bath; blisters, issues, &c. These remedies should be assisted with mechanical contrivances, for gradually bringing the head into a straight position.

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* Anfangsgr. der Wundarzneykunst, band 4, p. 270.

The malady sometimes originates from a contraction of the muscles on one side of the neck, quite unattended with the smallest perceptible induration. This is the sort of case, for which an operation is advised for dividing the contracted muscular fibres. This, however, must only be performed, when the wry neck depends entirely, or principally, on a contraction of the sterno-cleido-mastoideus. When the defect is situated in the other muscles, the operation is not practicable. When the above muscle is alone, or chiefly concerned, the face is always turned from that side to which the head is inclined; and, in endeavouring to put the head in a straight position, the fibres of the muscle are rendered exceedingly tense. But, in this instance, the operation should only be undertaken, when there is no malformation of the cervical vertebræ.

. Wry necks sometimes depend on paralysis of the muscles of one side of the neck, particularly, of the sterno-cleido-mastoideus. The muscles of the opposite side, in this case, draw the head out of its proper position, in consequence of not being counteracted by their paralytic antagonists.

Electricity has been known to cure a case of this description. The head should be kept in a straight position during the trial of this remedy, as paralytic muscles are more apt to recover their tone, in a tense, than in a relaxed state. If this plan should fail, a division of the sound sterno-cleido-mastoideus may sometimes be rationally performed.

In particular instances, the wry neck is entirely a spasmodic complaint.

In general, it is quite sufficient to divide the clavicular portion of the muscle. If the surgeon should determine to cut out a part of the fibres, the incision must be made through the skin exactly in the direction of this portion of the sterno-cleido-mastoideus. If he means only to divide it, a transverse wound will suffice. On this part of the muscle being completely exposed, the rest of the operation is to be completed by passing a director, and blunt-pointed curved bistoury, under the place, where the division is intended to be made. If a part of the muscle is to be removed, the operator may most conveniently finish the operation with a pair of forceps, and a common knife.

If great, but not complete, amendment should follow this division, the judgment of the practitioner must decide, whether cutting the sternal portion of the muscle across, presents a reasonable chance of doing further good.

CHAP. XXXVIII.

BRONCHOCELE.

BRONCHOCELE signifies an indolent enlargement of the thyroid gland; and, of course, it is attended with a swelling of the upper and front part of the neck. The tumor is quite free from pain; and, in its incipient state, is of a soft, spongy, elastic consistence. Its base is usually broad. When the case has existed some time, the gland loses its natural figure, assumes a firm fleshy feel, being, however, firmer in some places, than in others, and it spreads towards each side of the neck. The diseased gland may, in time, attain a prodigious magnitude. When the adjacent cellular substance, and lymphatic glands, participate in the disease, the base of the swelling sometimes extends from one side of the neck to the other. In some instances, only one lobe of the gland is affected.

The bronchocele seems to be endemic in several mountainous countries; for instance, Switzerland, Savoy, Tyrol, Derbyshire, &c. It is most frequent in young persons, and occurs more often in the female, than the male sex.

Dr. Baillie observes, that when a section is made of the thyroid gland, affected with this disease, the part is found to consist of a number of cells, which are of different sizes, and contain a transparent viscid fluid.*

The ordinary bronchocele is entirely a local disease, patients usually finding themselves, in other respects, perfectly well. The tumor itself frequently creates no particular inconvenience; only deformity. Large bronchoceles, however, are frequently attended with obstruction to respiration, and hoarseness of the voice. There is no malignancy in the disease, and the swelling does not readily inflame.

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* Morbid Anatomy of some of the most important parts of the Human Body, p. 84, edit. 2.

I shall say nothing of causes, as they are involved in great obscurity. Sometimes the disorder is undoubtedly connected with a scrofulous habit.

TREATMENT OF BRONCHOCELE.

The disease, in a recent state, may frequently be cured; when inveterate, though it is often capable of being considerably diminished, it is hardly ever entirely removed.

The most celebrated remedy for bronchocele is burnt sponge, given in the dose of a scruple, two or three times a day. The powder may be made into an electuary with syrup. Some prescribe burnt sponge in the form of a troche, the efficacy of which is said to depend very much on its being placed under the tongue, and allowed to dissolve there in a gradual manner. It is sometimes customary to add a grain of calomel to each of the above doses. Many practitioners exhibit a mercurial purgative about once a fortnight, during the trial of the medicine. Natron ptt. (mineral alkali) is another medicine, occasionally employed in the present cases.

Other remedies are, two scruples of calcined egg-shells, given every morning in a glass of red wine; ʒss. of the kali sulphuratum, dissolved in water, taken daily; ten or fifteen drops of the tinct. digit. purpur. twice a day, the dose being gradually increased; muriated barytes; cicuta; belladonna, &c.

External applications may also be employed in conjunction with any of the above internal remedies. Repeated frictions of the swelling, with a dry towel, and bathing it very often with cold water, prove very beneficial. Some practitioners direct the part to be rubbed with the aq. ammon. acet., or with a liniment, composed of an ounce of camphor, three drams of olive oil, and the same quantity of the spir. ammon. comp.

Very large bronchoceles, sometimes, obstruct respiration, deglutition, and the return of the blood from the head, in so serious a degree, that a surgeon would feel greatly inclined to make any rational attempt to relieve his patient, even though it might be one of a bold description. For the relief of these cases, two operations have been proposed; one consists in cutting out the enlarged gland; the other in effecting a reduction of its size by tying the superior thyroideal arteries.

EXTIRPATION OF THE THYROID GLAND.

This operation can only be attempted with prudence, before the part has become exceedingly large, and, then, indeed, the symptoms are seldom sufficiently pressing to induce the patient to submit to a measure, which, is, no doubt, attended with a serious degree of hazard. Until recently, surgeons have had very little encouragement to attempt the extirpation of bronchoceles. In one instance, in which Mr. Gooch saw the endeavour made, the hemorrhage prevented the completion of the operation, and the patient died in less than a week, the bleeding having never entirely stopped. In a second case, adverted to by the same writer, the patient's life was preserved by having a succession of persons to keep up a constant pressure on the wounded vessels, day and night, for nearly a week, the surgeon not having been able to secure them with the needle and ligature. Mr. Gooch likewise mentions a third case, in which the operation was followed by a great deal of bleeding, and a fatal event.*

The unfortunate terminations of these cases may be imputed partly to the disease having been allowed to become too large, and, partly, to imperfections in the mode of operating. That bronchoceles, when not of excessive size, may be extirpated with success, is now completely proved by the experience of Desault, Theden, and Vogel, who have all practised the operation, with the happiest consequences. In a case, in which the tumor was two inches in diameter, round, hard, and adherent to the middle of the right side of the trachea; and in which, it thrust outwards the sterno-cleido-mastoideus muscle, was raised by each diastole of the arteries, followed the movements of deglutition, and somewhat obstructed the passage of solid food; Desault performed the extirpation after the following manner: an incision was made along the middle of the swelling, beginning about an inch above, and ending at the same distance below it. This extent was given to the wound, for the purpose of having plenty of room for the continuance of the dissection. The inner edge of the incision being drawn to the left by an assistant, the tumor was next separated from the sterno-cleido-mastoideus by the operator cutting the cellular substance, that connected these parts. In doing this, two small arteries were divided, and immediately tied. The next object was to detach the inner part of the swelling from the trachea. While this was performed, the assistant drew the tumor outwards with a hook. In this part of the operation, several branches of the thyroid arteries were tied as soon as cut.

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* Gooch's Chirurgical Works, vol. 3, p. 158—160, edit. 1792. To these unsuccessful cases may be added the example, recorded by Pelletan, in his Clinique Chirurgicale, where an enlarged thyroid gland, weighing two pounds six ounces, was cut out, after an operation, that took up an hour and a half, and proved fatal thirty five hours after its performance.

The assistant, with the hook, then pulled the gland inwards and forwards, while Desault finished the dissection outwards, and above and below. This part of the operation was the most difficult, and it was necessary every instant to wipe away with a sponge the little blood, that was effused, in order that the parts might be distinctly seen. The operator only ventured to divide a very little at a time, and every part was carefully examined with the fingers, before it was cut. With these precautions, Desault succeeded in exposing the superior and inferior thyroideal arteries, without wounding them, and a ligature was immediately put under them by means of a curved blunt needle. The vesels were then divided, and the detachment of the swelling from the trachea completed. The patient was discharged from the Hotel-Dieu, quite well, on the 34th day after the operation.

The tumor, which was removed, was nearly five inches in circumference. The wound, made in the operation, was almost three inches in depth, being bounded externally by the sterno-cleido-mastoideus, internally by the trachea and œsophagus, and behind by the common carotid, and par vagum, which were visible.*

That the extirpation of the thyroid gland is a delicate and difficult operation, must be evident to every body, at all acquainted with anatomy. Above, the superior thyroideal arteries; below, the inferior ones; and, sometimes also that branch, which was first discovered by Neubort; at the sides, the common carotids, and internal jugular veins; in front, an extensive plexus of veins; and the trachea, œsophagus, recurrent nerves, and par vagum, all close to the tumor; are numerous parts of such importance, as to make the operation a business only fit for a surgeon, who, to the most correct anatomical knowledge, joins a steady hand, and an undaunted mind.

The imperfection, to which I alluded in speaking of the operations mentioned by Gooch, consisted in not tying every small artery as soon as it was divided, and cutting away the swelling, without endeavouring first to secure the large arteries. Attention to these circumstances constituted the excellence of Desault's plan of operating, and enabled him to surmount every danger, as far as hemorrhage was concerned.

OF TYING THE SUPERIOR THYROIDEAL ARTERIES.

When respiration and deglutition are dangerously interrupted by an immense bronchocele, the removal of which seems impracticable, it certainly seems a warrantable experiment to expose and tie the superior thyroideal arteries. When the quantity of blood flowing into a tumor is greatly lessened, the size of the swelling commonly soon undergoes a considerable diminution. This may be regarded as a general principle, in the treatment of all tumors whatsoever. This operation has been actually practised, and though a fatal hemorrhage succeeded, the great decrease in the size of the gland, before death, is a sufficient encouragement to repeat the trial, particularly, as the method of applying ligatures round large arteries is now brought into a very improved state. If the femoral, and even the external iliac arteries, will heal, when tied in the manner recommended by Mr. Abernethy; if also the common carotid will undergo the same beneficial change, as recent cases have proved;* we can entertain no doubt, that the superior thyroideal will do so. In fact, Desault, Theden, and Vogel have tied all the thyroideal arteries in extirpating bronchoceles, and these vessels healed as well as any others.

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* Œuvres Chirurg. de Desault par Bichat, tom. 2, p. 298—301.

In applying the ligature, the operator, above all things, should be very careful to use one, which is firm, and of an evenly round shape, which qualities tend to render the division of the inner coats of the artery more certain of happening in the most desirable way. With the same view, the vessel should be tied with due force, and, for reasons, explained in the chapters on Hemorrhage, and Aneurisms, the ligature should be applied to the vessel, as closely as possible to where it lies among its natural connexions.

CHAP. XXXIX.

WOUNDS OF THE THORAX

ARE divided into such as do not penetrate, and into others which do penetrate, that cavity.

The former do not differ in their nature from common wounds; and, therefore, do not demand particular consideration.

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* See Medico-Chirurgical Trans. vol. 1, and 2.

Cuts and sabre wounds hardly ever interest the parts contained in the chest; stabs and gunshot wounds are the ordinary kinds of violence, by which the thoracic viscera are injured.

Wounds, which simply penetrate the chest, without wounding any contained part, are often unaccompanied by any material consequences.

It is frequently difficult to pronounce positively, whether a wound extends into the cavity of the thorax or not. Many punctured wounds are very long and narrow, so as not easily to admit a probe to their termination. Many are made when the patient is in a posture, which you cannot precisely ascertain, and in which alone their track can be traced with a probe. But, if the symptoms do not indicate any difference, between a superficial wound of the chest, and one, which just enters its cavity, no practical good can result from knowing to which description it answers, and much mischief may arise from tedious examinations.

However, sometimes the passage of air into, and out of the chest, through the wound, leaves no doubt, that the injury extends beyond the pleura costalis. But, this symptom can only be expected, when there are no circumstances present rendering the wound tortuous, or not freely pervious.

The entrance and exit of air, through the wound, arise from the alternate enlargement and contraction of the thorax in respiration. It is well known, that, in the perfect state, the surface of the lungs always lies in close contact with the membrane lining the ribs, both in inspiration and expiration. The lungs themselves are only passive organs, and are quite incapable, by any action of their own, of expanding and contracting, so as to maintain their external surface constantly in contact with the inside of the thorax, which is continually undergoing an alternate change of dimensions. Every muscle, that has any concern in enlarging and diminishing the chest, must contribute to the effect of adapting the volume of the lungs to the cavity, in which they are contained, while there is no communication between the cavity of the pleura and the external air. In inspiration, the thorax is enlarged in every direction, the lungs are expanded in the same way, and the air, entering through the windpipe into the air-cells of these organs, prevents the occurrence of a vacuum.

But, when there is a free communication between the atmosphere and the inside of the chest, on this cavity being expanded, air must enter into the bag of the pleura, and the lung remain proportionally collapsed. There are several reasons, why this event does not regularly take place in wounds of the chest; the principal one is, that the opening is seldom sufficiently ample and pervious, and is soon covered with dressings; another is the great frequency of adhesions between the pleura costalis, and pleura pulmonalis.

When, however, air has entered the bag of the pleura, through the wound, it is partly forced out again when the muscles of expiration diminish the capacity of the thorax.

It is a wise arrangement to have no communication between the two bags of the pleura: if it were not so ordained, suffocation would be a common consequence of large wounds extending into the chest. Bertrandi informs us, that if a free opening is made into each side of the chest, in an animal, suffocation is always the consequence, because both lungs collapse.

We shall next notice the most urgent symptoms, likely to follow wounds of the chest, and the method of treating them.

EMPHYSEMA.

This is a term, applied to a swelling, arising from a diffusion of air in the cells of the cellular substance. This symptom may occur in wounds, which just enter the cavity of the chest; in others, that extend more deeply, so as to wound the lungs; and also in cases, in which these organs are wounded by the spiculæ of a broken rib, or clavicle, while there is no outward wound whatever. I believe emphysema is never very extensive, unless the air vesicles of the lungs are injured, and there is no outer wound, through which the air can freely make its escape. Hence, we find, that emphysema is a more common consequence of fractured ribs, and narrow stabs, than of large penetrating wounds; because, in the latter cases, the air readily passes outward, through the opening.

When the chest becomes expanded, in the act of inspiration, some of the air, which enters through the trachea into the wounded lung, instead of distending this organ, now passes through the breach in it, so as to get into the space between the pleura pulmonalis and pleura costalis. Dr. Halliday* has very accurately remarked, that, in the living body, the whole of the inspired air will not be thus effused; but, that, as it must pass through the lung, it will at first distend it, more, or less, according to the size of the opening in the pleura pulmonalis. This partial dilatation of the wounded lung will always happen while air continues to be inspired on that side.

When the thorax is next diminished in the act of expiration, the effused air is compressed against the wounded lung; but, none of it can enter this viscus again, because the whole of the air, contained in the lung, must be forced out, and the effused air makes equal pressure on every part of the organ, as this becomes collapsed, so that it cannot separate any particular part, and make a passage for itself towards the trachea.

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* Observations on Emphysema, 1807.

In this manner, fresh air accumulates in the space between the pleuræ at every inspiration, while none can escape during expiration. This case may produce suffocation, from the pressure of the collected air on the diaphragm, mediastinum, and opposite lung.

However, as emphysema commonly follows narrow stabs, or fractures of the ribs, attended with injury of the lungs, the pleura costalis and intercostal muscles are at the same time wounded, or lacerated, so that part of the air also usually gets through the above wounded membrane and muscles, into the cellular substance on the outside of the chest, and thence is sometimes diffused, through the same substance, over the whole body, so as sometimes to inflate it in an extraordinary degree. The inflation of the cellular substance has been considered the most dangerous part of the disease; but, Mr. Hewson* most ably shews, that this is only an erroneous supposition.

This gentleman remarks, that the wound of the pleura and intercostal muscles may sometimes be too small to suffer the air to get readily into the cellular membrane, and may confine a part of it in the cavity of the thorax, so as to compress the lungs, and cause the same symptoms of tightness of the chest, quick breathing, and sense of suffocation, which water does in hydrops pectoris, or matter in empyema.

The air, however, in general, makes a way for itself through the cellular membrane, and as the passage of air into the cavity of the thorax, through the breach in the lung, during inspiration, is more easy, than the return of that, which has been already effused into the cellular membrane, this effusion continues to go on, with great rapidity, being increased by every act of expiration.

One of the most remarkable cases of emphysema is related by Littre†. The swelling on the chest was eleven inches thick, nine on the abdomen, and four on all other parts of the body, except the scalp, palms of the hands, and soles of the feet. The patient spit blood, had much difficulty of breathing, and made violent efforts to inspire.

So unlimited is the diffusion of air, in some cases, that the cellular substance beneath the conjunctiva of the eye has been known to be prodigiously inflated.

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* Med. Observations and Enquiries, vol. 3.

† Mém. de l'Acad. Royale des Sciences, pour 1713.

From what has been stated, it is evident, that, in cases of emphysema, the danger does not depend so much on the degree of external swelling, as on the degree of compression produced on the mediastinum, diaphragm, and the lung of the opposite side.

If air does not diffuse itself in the cellular substance, before the third or fourth day from the accident, there is not much chance of its doing so afterwards, because the extravasation of coagulating lymph, around the wound, shuts up the cavities of the cellular substance.

TREATMENT OF EMPHYSEMA.

In cases, in which the air has not escaped from a wound of the lungs themselves, and only a moderate quantity has yet insinuated itself into the bag of the pleura, I see no objection to covering the external aperture of the wound with adhesive plaster. It is true, that, as soon as the air, already present, finds an impediment to its escape, from the wound, it will be likely to diffuse itself in the surrounding cellular substance. To counterbalance this inconvenience, it is clear, that, in proportion as the air diffuses itself in this manner, the lungs must expand to fill up the vacuum produced in the cavity of the thorax, and the oppression of respiration will be diminished. The external emphysematous swelling cannot be productive of any serious consequences, and can only increase as long as the stock of air in the chest remains unexhausted. If the swelling should be very large, two or three small scarifications may be made, in order to give vent to the confined air.

Just before placing the adhesive plaster over the external aperture of the wound, it is erroneously directed, that the patient should draw as much air into the lungs as possible, and retain it there till the plaster has been applied. In this particular case, the air enters the cavity of the chest, through the external wound, at the same time, and from the same causes, as it enters the lungs through the trachea; consequently, the exact moment, when the mouth of the wound should be closed, is at the end of a powerful expiration.

The difficulty of ascertaining positively, whether the lungs are not superficially wounded, so as to furnish a part of the air, may sometimes make it difficult to decide, whether it is right to adopt the foregoing practice or not. When the external wound has been closed, and the difficulty of breathing increases, while the emphysema spreads, it is then rational to conclude, that the air escapes from a wound of the lungs into the cavity of the thorax, and thence into the cellular substance in the vicinity of the external wound. In this circumstance, the air must be allowed to pass and repass through the wound, until sufficient time has been allowed for the wound in the lungs to be closed with coagulating lymph; and if the symptoms of pressure on the lungs are very urgent, and the air does not readily escape through the wound, it is proper either to make this more direct, if conveniently situated, or to make another opening into the bag of the pleura. The mode of performing paracentesis thoracis will be mentioned hereafter. In emphysematous cases, a very small, but direct, and pervious opening, is proper; for, if there be much air compressing the lungs, it will escape through a small, as well as a large opening, and without so much chance of inflammation as when a large one is made.

In five or six days, we may generally conclude, that the wound in the lungs is healed; and this may be known by the great diminution in the quantity of air issuing through the wound. The external wound may now be closed; and the lungs will gradually expand, as the air is absorbed.

Bandages round the chest, in emphysematous cases, must, generally speaking, be exceedingly improper, as long as air passes from the wounded lung into the bag of the pleura. They must strongly tend to prevent the air issuing from the chest, and, therefore, augment the degree of compression on the lungs.

When the emphysema is large, it is highly proper to give an outlet to the air, by making small punctures in various situations, and promoting its exit by frictions. Indeed, the surgeon is always to be content with this practice, unless the symptoms of compression on the diaphragm and opposite lung, and the approach of suffocation, denote, that the air cannot get out of the cavity of the pleura so quickly as it finds its way into it; in which case, a small, but direct, opening is to be made into that side of the chest, on which the wound is situated.

The practice of endeavouring to exhaust the air from the chest with syringes is now generally deemed superfluous, as the air is soon absorbed; and the use and possibility of making the collapsed lung expand in this sudden way, are not credited by the best practitioners. The objection to immediately closing a wound, practised to remove the pressure of the air off the diaphragm and opposite lung, is, that this pressure may possibly recur, in consequence of the air collecting again. Perhaps, the most advisable plan is to keep a short cannula in the wound, for about forty-eight hours. Particular caution must be taken to secure the instrument from slipping into the cavity of the thorax. In this way, the wounded lung will collapse, and quietly remain in a state, the most favourable for the healing of the breach in it; the air cannot become confined, so as to make dangerous pressure on the diaphragm, mediastinum, and opposite lung; and this latter will be enabled to do its functions, so as to support life, till the wounded lung is in a condition to renew its office.

The cannula, however, need not to be kept introduced longer than two days; because, at the end of this time, the wounded cells of the lung will certainly be closed with coagulating lymph, and no more air can escape. The external wound, of course, may now be healed, and, in proportion, as the air in the chest is absorbed, the lung will expand again.

Unfortunately, the pressure on the lungs in these cases is not always simply owing to air: copious extravasations of blood not unfrequently exist at the same time.

WOUNDS OF THE LUNGS, &c.

When blood is coughed up immediately after the chest has been wounded, and when, at the same time, blood, blended with mucus and air, issues from the external opening, the lungs are certainly injured.

Wounds of the lungs are attended with great danger; fatal hemorrhage, extravasation of blood into the large branches of the bronchiæ, and consequent suffocation; copious effusions of blood into the cavity of the pleura; violent peripneumony, and suppuration in the chest; form a long list of very alarming consequences.

When the wound takes place near the root of the lungs, it is commonly fatal, on account of the large size of the vessels at that part. Superficial wounds of the lower and anterior portion of the lungs are frequently cured.

TREATMENT.

When a wound of the lungs is not immediately mortal, the grand surgical indication is to keep the consequent peripneumony from becoming so violent as to occasion death, or suppuration in the chest. The antiphlogistic treatment, in the full sense of the expression, is to be put into practice, and, in a most particular manner, bleeding. The lancet must be used as often as the pulse betrays the least disposition to rise. Le Dran bled one man, whom he cured of a wound of this description, not less than fifteen times. Schmucker bled a patient, in a similar case, four times a day for eight days successively.* Leeches should also be repeatedly applied to the outside of the chest. Perfect quietude is to be enjoined. The patient should be cautioned not to talk, nor make any strong expiration, or inspiration. A cough is, above all things, to be appeased, as it creates immense disturbance of the wounded parts.

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* Anfansgr. der Wundarzneykunst, band 4, p. 327.

The dressings are to be merely superficial. The introduction of tents proves seriously hurtful. After a few days, the lungs usually contract an adhesion to the pleura costalis, at the circumference of the wound; and this connexion, which is desirable, because it prevents the insinuation of matter into the chest, is very likely to be hindered from taking place by the irritation of tents.

When the lungs happen to be wounded in the centre of an adhesion between the pleura pulmonalis, and pleura costalis, it is a fortunate circumstance, as there is then no chance of air, blood, and pus, finding their way into the cavity of the thorax.

Great constitutional disturbance sometimes occurs immediately after a wound of the lungs; such as feeble respiration; a small, almost imperceptible pulse; vomiting; coughing; coldness of the extremities; swooning, &c. As long as symptoms like these exist, phlebotomy may be deferred, and opium is the best medicine. But, immediately the patient has recovered from this state, bleeding is to be freely practised.

It is said, that the substance of the lungs occasionally becomes emphysematous: the air escapes from the air vesicles into the interstitial cellular texture; so that the former are compressed, and the patient dies suffocated.

EXTRAVASATION OF BLOOD IN THE THORAX.

This is liable to happen in all cases, in which the lungs, the intercostal, or internal mammary arteries are wounded.

The symptoms of blood, thus effused, are, great oppression of the breathing; inability to stand, or sit up, owing to the weight of the fluid on the diaphragm; the most easy posture is on the affected side; but, the patient cannot lie on the opposite one, without great aggravation of his oppressed breathing; the respiration is short, frequent, and interrupted; the countenance is particularly pale.

Together with these symptoms, which are indeed very inconclusive, the extremities become cold; a clammy perspiration takes place; and if the lungs are wounded, frothy blood is spit from the mouth, and often air escapes from the wound. It is to be regretted, that these symptoms are extremely fallacious.

TREATMENT.

Extravasation of blood in the chest is an exceedingly urgent case, both because the patient is not only in danger of immediately dying of the inward hemorrhage, but also suffers pressing symptoms of suffocation. These latter, it is true, call for paracentesis thoracis, in order that the diffused blood may be discharged, and its pressure be removed from the lungs; yet, this very proceeding is itself hazardous, as it may renew the internal bleeding, of which the patient may at once perish. Thus, the surgeon has before him two dangers, equally great; viz. that of seeing his patient die of suffocation, if the operation is not performed; and that of beholding him fall a victim to hemorrhage, if an opening is made for the evacuation of the blood before the wound in the vessel is closed.

I believe, that, in this difficult part of surgery, they are generally the most prudent practitioners, who are inclined to await events and temporise. For, should the hemorrhage proceed from a vessel of inferior order, and chance to be suspended, by the pressure of the effused blood itself, or the formation of a coagulum, hopes may be indulged, that the lungs will bear the compression, until the extravasated fluid is absorbed. This desirable event may be looked for with the greatest prospect of success, as the cavity, in which the effused blood lies, has no communication with the air, by which the process of putrefaction can be promoted.

If, after a time, the presence of the blood should be followed by suppuration in the cavity of the thorax, the urgency of the symptoms, arising from this new state of the case, must then determine the propriety of the operation. The danger of renewing the bleeding is now past, and no longer a consideration in the mode of treatment.

When the bleeding takes place from a vessel of the first rate magnitude, the symptoms of suffocation are excessively urgent; and, yet the danger of making an opening for the discharge of the blood is proportionately great, as the hemorrhage cannot effectually have ceased. Many surgical writers authorize, in these circumstances, a partial evacuation of the effused blood; but, I am inclined to think with Pelletan, that the cases, in which such practice will answer the purpose of relieving the breathing, without being followed by a renewal of the hemorrhage, must be extremely rare.* After a few days, however, things are much changed, and, if the patient be yet alive, but, his respiration urgently interrupted by the pressure of the effused blood, the wound in the vessel may now be regarded as closed, and paracentesis may be done, without risk of renewing the internal bleeding.

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* Clinique Chirurg. tom. 3, p. 240.

When the propriety of discharging a collection of blood in the chest has been determined upon, it still remains for the surgeon to make choice of one of the several plans, which have been proposed. These are: 1. Placing the patient in such a posture as is favourable to the exit of blood from the wound. 2. Drawing the blood out with a syringe. 3. Enlarging the wound. 4. Making an opening at a depending part of the chest.

1. We can only expect to afford relief by mere posture, when the wound is large, and direct in its course, and the blood is in a fluid state.

2. Syringes, to exhaust the blood out of the chest, are seldom necessary: when the blood is fluid, it will escape spontaneously, on a depending opening being made; and, when coagulated, it cannot be drawn out with such instruments.

3. The wound should only be enlarged, when its situation is favourable for the escape of the blood.

4. When the blood is coagulated, the injection of warm water has been recommended. It is not to be done with too much force; and it is to be repeated every day, till the fluid returns untinged with red globules, and quite free from coagula.

5. When the wound is narrow, and situated either at a fleshy part of the chest, or at its upper part, a counter opening should be made* in a depending situation, and in a manner, which will be mentioned in the next chapter.

CHAP. XL.

PARACENTESIS THORACIS.

THIS operation consists in making an opening into the cavity of the chest, for the purpose of giving vent to air, water, matter, or blood, by the pressure of which, the functions of the lungs are dangerously obstructed.

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* See on this subject Sabatier, in Médécine Opératoire, tom. 2, p. 234, 237.

The surgeon can hardly ever know with certainty, that a fluid is contained in the chest, so equivocal are the symptoms ordinarily enumerated by writers. If there were not this most cogent reason, still the idea of performing the present operation with such an instrument as a trocar, is deserving of the strongest reprobation. The proper instrument is a small bistoury; and the operation, when adroitly executed with this, cannot be deemed a dangerous one. Hence, though there may be doubt in almost every case, concerning the presence of a fluid in the chest, still the practice of paracentesis is sometimes exceedingly plausible.

When the cavity of the chest is filled with water, the disease is termed *hydrops pectoris*; when with pus, *empyema*, a word implying internal suppuration. Both water and pus, extravasated in the chest, have some symptoms common to them; such as short and difficult respiration, the lungs of the affected side being compressed by the collection of surrounding fluid. In both cases, also, expiration is even more difficult, than inspiration, on account of the weight of the fluid, which strongly opposes the elevation of the diaphragm. Sometimes, when the patient moves in bed, he distinctly feels the undulation of a fluid. If this is contained in only one cavity of the chest, he cannot lie comfortably on the opposite side, because the fluid then compresses the other lung. The ribs on the affected side are observed to be more arched, than is natural, because the fluid resists their depression. When no symptoms of suppuration have occurred, the case may be deemed hydrops pectoris. The face, the integuments of the chest, and lower extremities, are frequently œdematous, and sometimes also the arm on the side affected, especially, when the quantity of fluid is copious. Sometimes the dropsy of the chest is joined with the same general affection of the body. All these symptoms, however, may indicate empyema, when combined with preceding marks of inflammation and suppuration in the chest. When symptoms of acute peripneumony have taken place; and when rigors have occurred at the termination of the inflammatory fever, just before the commencement of the above kind of symptoms; it is rational to infer, that the case is empyema. I remember a man in St. Bartholomew's hospital, whose heart was pushed quite to the right side of the chest, by a collection of matter in the left bag of the pleura. The preceding existence of inflammation in the chest, the occurrence of rigors, the great difficulty of breathing, and the palpitation of the heart, quite on the right side of the thorax, enabled me to foretell the nature of the case before the man died. On opening the left cavity of the chest, a very enormous collection of matter was discovered. In this instance, paracentesis thoracis ought undoubtedly to have been performed. The pressure of the matter on the mediastinum and opposite lung must have been such, as entirely to obstruct respiration.

With regard to the place, which is the most proper for making an opening into the chest, a few words are necessary, because some very excellent modern surgeons, and among them Bertrandi,* disregarding every other consideration, but that of making a depending aperture, advise us to perform the operation between the third and fourth false ribs, counting from the last, and about four or five finger-breadths from the spine. But, every object can be effectually obtained by making an opening more forward, where there are no muscles, except the intercostals, to be divided. The most eligible place, is between the sixth and seventh true ribs, just at that point, where the indigitations of the serratus major anticus terminate. By placing the patient on his abdomen, this opening may be rendered a very depending one.

An incision, about two inches long, must be made through the integuments. These are first to be drawn to one side, if it be intended to close the wound immediately afterwards. The intercostal muscles are next to be cautiously divided, and a small puncture carefully made in the pleura costalis, as soon as it is exposed. The intercostal muscles must be divided closely to the upper edge of the lower rib, in order to avoid any chance of wounding the intercostal artery, which runs in a groove along the lower edge of the upper rib.

In emphysematous cases, a small puncture will generally suffice; in hydrops pectoris, it may be made somewhat larger; and, in empyema, the matter must have an opening of sufficient size to allow the fluid to escape freely, and a cannula to be afterwards introduced. Mr. Hey thinks it of great consequence to retain a cannula in the wound, until all probability of a relapse is removed.†

In cases of empyema, a late writer lays great stress on the advantage of introducing a dossil of lint into the incision, and only allowing the matter to escape by degrees; he thinks, that when the pus is discharged all at once, the atmospheric air insinuates itself into the chest, so as to keep the lungs collapsed longer, than would otherwise happen, and do further harm by disposing the purulent matter in the thorax to putrefaction.‡

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* Traité des Opérations de Chirurgie, p. 253, 254, edit. 1784.

† See Practical Observations in Surgery, p. 497, edit. 2.

‡ See Pelletan's Clinique Chirurg. tom. 3, sect. 4, p. 291, &c.

CHAP. XLI.

REMOVAL OF A DISEASED BREAST, AND TUMORS IN GENERAL.

THE manner of removing encysted tumors has been already described.

When the breast is affected with any disease of an incurable nature, the surgeon can sometimes extirpate the malady by cutting away the whole of the diseased parts.

If the disease be of a scirrhous, or malignant, nature, some particularity in the mode of operating is requisite. The surgeon ought, in this case, not to be content with merely removing parts, which are palpably and visibly diseased; he should likewise endeavour to remove a certain quantity of the substance, which is in the immediate circumference of the disease. In the observations on scirrhus, in the first part of this work, I have mentioned the propensity of the skin to be affected, and the frequent extension of white morbid bands into the surrounding adipose substance. These facts greatly confirm the propriety of making a free removal of the skin, whenever it is in the least discoloured, puckered, adherent to the swelling beneath, or in any way altered; and of taking away a good deal of the fat, in which scirrhous tumors are sometimes involved. When there are no reasons for supposing the disease of the breast to be any thing else, than a mere sarcomatous enlargement, the removal of the skin must certainly be considered unnecessary. When cancer recurs, the skin is the first part, in which it usually makes its appearance, and the skin of the nipple in particular. Hence, many surgeons always make it a rule to remove the latter part, when it is judged proper to take away any of the integuments.

The operation is usually performed as the patient is in a sitting posture, well supported by pillows and assistants.

The pectoral muscle is to be made tense by keeping the arm back, by means of a stick, placed transversely behind the back, in front of the arms, above the bend of the elbow.

If none of the integuments are to be removed, a straight incision is to be made through them; the tumor is to be regularly dissected all round from the circumjacent parts; and, lastly, its base is to be detached from its connexions, from above downward, till the whole is separated.

If the outer incision has been made transversely, the lower half of the swelling should be separated from its surrounding connexions, before the dissection of the upper portion is begun, by which means, the surgeon will not be incommoded by the blood, from the vessels above, falling into the lower part of the wound, before the detachment of the adjacent portion of the tumor is effected. As soon as the lower half of the swelling is separated from its connexions, the surgeon is to undertake the dissection of the upper half.

Such are the modes of removing all simple tumors, which are not of a malignant nature, nor of immense size.

When the tumor is of a malignant nature, and adherent to the skin and pectoral muscle beneath, the operator is to remove, at least, an inch or two of the fat on every side of the disease. The portion of the skin, intended to be taken away, must be included in two semicircular incisions; which meet thus () at their extremities; and when the base of the tumor is to be detached, the surface of the pectoral muscle, wherever it is adherent to the tumor, is also to be removed.

It is sufficiently obvious, that the advantage of making the incision in the above manner, consists in enabling the surgeon to bring the edges of the wound together after the operation, so as to form a straight line, and be capable of uniting by the first intention.

The mere magnitude of a tumor frequently renders it highly judicious to take away a portion of the skin in the above method. If some were not removed, the dissection of the tumor would be exceedingly tedious; and, after the operation, the loose undistended skin would lie in folds, and form, as it were, a large pouch for the lodgment of matter.

In the extirpation of a diseased breast, the direction of the external incision must partly be determined by the shape of the tumor; but, according to Desault, there are advantages in cutting as much as possible transversely, when circumstances will allow. It is alledged, that, as the integuments are more yielding upwards, or downwards, than they are in a cross direction, especially near the sternum, the transverse wound may be more expeditiously united; and that, as the great pectoral muscle only acts perpendicularly, with respect to the edges of the incision, it cannot tend to separate them. Desault thought these advantages of higher importance, than that of the easy escape of the matter at the depending angle of the wound; the reason generally assigned for preferring a perpendicular cut.*

The tumor being removed, the surgeon should examine the interior of the wound, in order to ascertain, that no indurated part is left behind. If any hardness should be felt, it is proper to remove it. The surgeon should also examine the surface of every scirrhous tumor, immediately it is taken out, for the purpose of knowing whether any of the white bands, shooting into the surrounding fat, have been divided; for, in this case, some portions have been left behind, and ought to be taken away. Their situation may be easily known, by considering the position of the tumor before the operation.

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* Œuvres Chirurg. de Desault par Bichat, tom. 2, p. 312.

When the dissection of a swelling will occupy a considerable time, it is always judicious practice to tie every large artery as soon as it is divided. This remark is not meant to comprehend vessels of such a diameter, that though they bleed when first cut, they do not emit blood afterwards, so as to require a ligature. It was Desault's invariable method, in cutting out tumors, to tie every large artery, before he continued the dissection.

When a tumor of the breast has been entirely detached, and the hemorrhage suppressed, the stick, confining the arms backward, is to be removed. Then, if there are any diseased glands in the axilla, it is a very excellent plan to tie the pedicles, by which they are attached on the side toward the thoracic artery, before attempting to cut the tumors completely away. It would be extremely difficult, after taking off the gland, to tie the little short artery, which enters the swelling, almost immediately it has quitted one of the thoracic arteries. The bleeding, also, in consequence of the shortness of the vessel, and vicinity of its orifice to the thoracic arteries, would be exceedingly profuse, seeming rather to arise from a wound of the latter vessels, than of a small branch.

The celebrated Desault used to pursue the practice above recommended; and Sir Charles Blicke has long been in the habit of observing the same rule, in the numerous operations, which he has performed with the utmost benefit to the afflicted, and well-deserved honour to himself.

The operation being finished, the skin of the wound is to be relaxed, and the edges brought together with adhesive plaster. Compresses and a bandage should next be applied. If a breast has been removed, the arm on the same side should be kept perfectly quiet in a sling, until the wound is healed.

CHAP. XLII.

WOUNDS OF THE ABDOMEN

ARE divisible into such as penetrate that cavity, and into others, which only interest its parietes. The former differ very much in their nature, according as they do, or do not, injure parts of importance contained in the abdomen. The latter are not materially different from the generality of other superficial wounds. To lower inflammation, and to prevent collections of matter, are the chief indications necessary to be observed in the treatment. However, in superficial wounds of the abdomen, there are a few particularities, which are deserving of notice.

SUPERFICIAL WOUNDS.

All authors, from the remotest antiquity, have recorded, that wounds of tendinous parts are more dangerous, than those of fleshy ones. Almost the whole front of the abdomen is covered with tendinous expansions; and hence, it is not uncommon to observe wounds in this situation followed by great local inflammation, which ends in the formation of abscesses. The constitution is, at the same time, disturbed with sympathetic fever: As the tension of the abdomen subsides, rigors occur, from which we have ground to suspect, that suppuration is about to take place.

The matter, which forms in these cases, sometimes makes its way into the tendinous sheath of the rectus muscle; and, when the collection of matter in this situation remains undiscovered, till a pointing happens, no sooner does it burst, or is it opened, than some quarts of pus will often gush out. The surgeon should bear in his mind the nature of this case, as there is frequently no change of appearance in the integuments to denote the occurrence and extent of the suppuration. This abscess ought to be punctured at an early period, and in a depending situation, sometimes, at the very lowest part of the sheath of the rectus muscle.

When matter also forms beneath the abdominal muscles, on the exterior surface of the peritoneum, the abscess should be opened soon, in order to prevent its discharging itself into the abdomen. The propensity of pus, to make its way to the surface of the body, however, is often seen to have immense influence in this sort of case. Though there is only a thin membrane intervening between matter so situated, and the cavity of the abdomen, yet the abscess mostly points externally, if the surgeon neglects to make an opening into it.

In all cases, in which the abdominal muscles are wounded, it is an indication to place the patient in such a posture as shall relax them.

As the peritoneum is connected with the inner surface of the abdominal parietes, there is always a chance of the inflammation of the muscles communicating itself to this membrane. The event is to be averted by the rigorous employment of the antiphlogistic treatment. When any point of the peritoneum is affected, the inflammation often spreads with immense rapidity over its whole extent.

The same treatment is applicable to superficial wounds of the abdomen as to others. Union by the first intention is to be attempted in every case, in which there are any hopes of success.

WOUNDS PENETRATING THE ABDOMEN WITH, AND WITHOUT, INJURY OF THE VISCERA.

A narrow, oblique wound may penetrate the cavity of the abdomen, without there being any mode of ascertaining easily, whether, it has done so, or not. This is of no practical importance; for, when there are no urgent symptoms, evincing the nature of the case, the treatment ought obviously to resemble that of a simple wound.

When a wound, penetrating the abdomen, is of sufficient size, the appearance of a portion of intestine, or of omentum in it, leaves no doubt, that the peritoneum is divided.

Profuse hemorrhage, from a wound of the abdomen, is a ground for suspecting, that some viscus of consequence is injured. There is no artery in the parietes of the abdomen, except the epigastric, from which much blood can be effused, and it is easy to learn, whether the hemorrhage proceeds from it, by considering the relative situation of the vessel and the wound.

Sometimes, the escape of the contents of particular viscera manifests what has happened.

But, whether any appearance of this kind presents itself, or not, must depend on the size and course of the wound.

When there are no external marks, denoting what viscera are injured, the surgeon may always form a judgment from the symptoms which follow, and which are of two kinds, general, and particular.

The former consist of a small, feeble, contracted pulse; pallid countenance; coldness of the extremities; great and sudden debility; hiccough; vomiting; spasms; and tension of the abdomen.

Such symptoms may, indeed, occur in irritable, timid subjects, without any important part being injured; but, then they usually go off very soon.

The particular symptoms, evince what parts are wounded; as, for instance, bloody urine, when the kidneys, or urinary bladder is wounded; vomiting of blood, when the stomach is injured; evacuation of blood with the feces, when the large intestines are wounded.*

Deep stabs have often been inflicted without wounding any parts of importance, contained in the abdomen; or if such parts have been injured, the ensuing symptoms were so mild as not to betray the real nature of the accident. It has been conjectured, that the great elasticity and mobility of the intestines may sometimes allow them to glide out of the way of a penetrating instrument.

Wounds, piercing the cavity of the abdomen, without injuring the contained parts, are not exempt from danger. In certain instances, they are productive of great irritation, and are followed by inflammation of the peritoneum, and suppuration within that membrane. These effects are, probably, not merely attributable to the formation of an external communication; for, the breach of continuity itself is a cause of inflammation. Perhaps, too much stress has been laid on the introduction of air into the abdomen as the cause of inflammation. In fact, the cavity of the belly is always so completely occupied by the various viscera, that the whole inner surface of the peritoneum is constantly in close contact with them, and, therefore, air cannot so easily diffuse itself from the wound throughout the abdomen, as has been conceived.

Notwithstanding the advice of numerous writers, that punctured wounds of the abdomen ought to be kept open with tents, for a few days, to allow matter to flow out, in case it should form, there can be no rational doubt, that an attempt ought always to be made to unite at once every kind of wound penetrating the abdomen. Success will only attend this effort, when the stab has produced but little contusion and laceration of the fibres; and when, consequently, there is no necessity for suppuration to occur. Yet, it is judicious to take the chance; for, if the external wound heals by the adhesive inflammation, it is improbable, that the deeper parts will not do so, when they have suffered only equal violence, and are naturally more prone to the adhesive inflammation, than parts nearer the surface of the body. The introduction of tents is itself a considerable irritation, and renders the formation of matter inevitable.

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* Richter's Anfangsgr. der Wundarzneykunst, band 5, p. 7.

It is advisable, therefore, to dress wounds of the abdomen according to the common principles. When of the incised sort, their edges are to be approximated by relaxing the muscles, which are interested; by the use of adhesive plaster; and by the application of the uniting bandage. Bleeding is to be practised; the mildest purgatives, such as oleum ricini, manna, and natron vitriolatum, are to be given; and perfect quietude is to be enjoined. In cut wounds, we usually know, whether any of the bowels are wounded.

When it is a punctured wound, without evidence of any important viscus being injured, the dressings should be quite simple and superficial. A pledget of the unguentum spermatis ceti, a small compress over it, and a roller applied moderately tight round the body, to diminish the motion of the viscera, are the best measures to be adopted. The patient is to be freely bled, and the smallness of the pulse, a peculiarity in inflammation of the peritoneum and bowels, is not to deter the surgeon from using the lancet; but, ought rather to convince him of the existence of such inflammation.

Herniæ often occur after wounds penetrating the abdomen have healed; it is therefore recommended to wear a truss afterwards on the situation of the cicatrix.

PROTRUSION OF THE VISCERA.

A portion of intestine, or omentum, usually protrudes through large wounds penetrating the abdomen. The sooner such parts are returned, the more effectually will the irritation, arising from exposure, and the pressure of the circumference of the wound on them, be prevented.

Fomenting the protruded parts, as is sometimes recommended, is a fruitless measure, and hurtful, inasmuch as it delays the reduction of them. The natural warmth and moisture of the abdomen are far more congenial to them, than any other application whatsoever. To facilitate the return of a piece of intestine, or omentum, that is protruded, the muscles of the abdomen should be relaxed by posture, and the large intestines be emptied with a clyster. The mesentery ought to be returned before the intestine; the intestine before the omentum; but, the last protruded portion of each of these parts ought to be the first to be reduced.

It is only when the intestine and omentum are free from gangrene, and unwounded, that they are always to be returned into the cavity of the belly, without hesitation.

The two index fingers are most convenient for reducing the parts; and it is a rule to keep the portion first returned from protruding again by one finger, until it has been followed by another portion introduced by the other finger. The second portion is to be supported, in the same way, by the finger used to return it, and so on, till all the displaced parts have been put into their natural situation.

The pressure should be made in a straight direction into the cavity of the abdomen; for, when it is made obliquely, towards the edges of the wound, the parts are liable to suffer contusion without being reduced, and to glide between the layers of the abdominal muscles. When the wound is in the anterior part of the belly, pressure, made in this manner, may cause the viscera to slip into the sheath of the rectus muscle.

As soon as the reduction seems complete, the surgeon is to assure himself of it, by introducing his finger into the cavity of the abdomen, to feel that the parts are all freely reduced, and do not suffer any constriction, between the edge of the wound and the viscera in the abdomen.

The distention of the protruded intestine with air or feces in its cavity, may create a difficulty of reducing it. By pressing the contents towards the wound, they may be frequently made to pass, by little and little, into that portion of the intestinal canal, which is within the abdomen, and the gut may then be returned. Should this plan not be found easy, I should prefer dilating the wound, to handling and contusing the bowel too much.

Paré and Peter Lowe have recommended a particular method of returning the inflated intestine, without enlarging the wound: it consists in making small punctures in the bowel with a needle, through which punctures the air may escape, and leave the intestine in a collapsed state. Respecting this proposal, I believe all modern practitioners now give it a decided condemnation, both on the ground of danger and inefficacy. Blancard has published an instance, in which it failed.* The fact is, the small apertures, made with a round needle, will not serve to discharge the air, since they become closed by the mucous coat.† The making of larger punctures, as suggested by Chopart and Desault,‡ would be less dangerous, than dilating the wound.

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* Collect. Medico-Physic. Part. ult. obs. 1.

† See Travers on Injuries of Intestines, &c. p. 176.

‡ Traité des Maladies Chirurg. tom. 2, p. 135.

Hence, I must join La Faye, Sabatier, &c. in reprobating this proceeding, and profess myself an advocate for the enlargement of the wound.

Sometimes, a piece of intestine, protruded from the belly at a narrow wound, suffers such constriction, that dilating the wound becomes indispensable. Relaxation of the abdominal muscles; drawing a little more intestine out of the wound, and gently pressing its contents, through the constriction into the abdomen, will, however, occasionally render the protruded part sufficiently reducible.

When it is absolutely necessary to enlarge the wound, the dilatation should be made in a direction, which will not endanger the epigastric artery. The incision should, if possible, be made in the direction of the muscular fibres. It is unpardonable to make the dilatation to a greater extent, than is necessary: for, herniæ are very liable to happen, whenever the peritoneum has been divided.

For the description of the method of dilating the wound, the reader is referred to the account of the mode of dividing the stricture in cases of herniæ.

When a considerable part of the protruded intestine is cut across, one stitch with a small needle and fine thread, should be made, for the purpose of keeping the edges of the opening near each other. The bowel is then to be reduced.

Mortification of a part of the exposed intestine may happen, before surgical assistance is obtained. This event is rare in cases of wounds; but, not uncommon in those of incarcerated herniæ. The kind of treatment, applicable to it, will be explained in the account of ruptures.

When the protruded intestine is in a state of inflammation, its immediate reduction is, beyond all dispute, the means most likely to set every thing right. Even when the inflammation has risen to a vehement pitch, a timely reduction of the displaced part, and the employment of the antiphlogistic plan, will often serve to prevent the occurrence of gangrene. The dull, brown, dark, red colour of the protruded intestine, may induce the practitioner to suppose, either that it is already gangrenous, or that gangrene is inevitable, and, consequently, he may delay returning it into its natural situation. But, notwithstanding this suspicious colour of the intestine, its firmness will evince, that it is not in the state of gangrene, and, therefore, its immediate reduction ought to be put into practice. The recovery of a portion of intestine, so circumstanced, is always a matter of uncertainty; but, the propriety of speedily replacing it in its natural situation, is a thing most certain. In case it should mortify, after being reduced, all hopes of the preservation of life are not to be abandoned, as I shall again notice at a proper opportunity.

It is unnecessary to state any thing here, concerning the reduction of protruded omentum, as every useful information on the subject will be found in the chapter on Herniæ.

OF GASTRORAPHE.

Gastroraphe is only a quilled-suture, employed to unite wounds penetrating the cavity of the abdomen.

The only circumstance, in which it differs from the quilled-suture already described, is its being introduced through both lips of the wound from within outward, in order not to endanger the adjacent viscera. Two needles are, therefore, placed on the same ligature. The peritoneum, muscles, and integuments, are all to be included in the suture.

Gastroraphe is to be aided by the observance of a proper posture, the application of adhesive plaster, and the uniting bandage. Every thing, which puts the abdominal muscles into action, drags the suture, irritates the wound, and creates a risk of the threads cutting their way through the part, in which they are introduced, and consequently, ought to be avoided. To prevent exertion of the muscles, the bowels are to be emptied with clysters. Opium quiets the sickness frequently attendant on wounds of the abdomen. The rigorous adoption of antiphlogistic means is to be observed.

In about eight days, the sutures may generally be removed, and the cure is to be conducted with the use of sticking plaster, and the uniting bandage, and the observance of a position, which affords the greatest degree of relaxation to the injured muscles.

When any part of consequence is wounded, and pours forth its contents into the cavity of the peritoneum, it is recommended to leave the most depending angle of the wound unclosed.

In a dissertation on the abuse of sutures, written by M. Pibrac,* we find cases, which evince, that wounds of the belly readily unite, by means of a suitable posture, and a proper bandage, without having recourse to gastroraphe. However, these are less decisive, than relations of the Cæsarean operation, the extensive wound of which has oftentimes been healed by these simple means, after the failure of sutures. A bandage, made upon the plan of an eighteen tailed one, might be very useful in longitudinal wounds of the abdomen.

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* See Mém. de l'Acad. de Chir. tom. 3, 4to. Other cases of similar success may be perused in numerous works, Journal de Médecine, tom 71; Duncan's Medical Commentaries, vol. 10; Philosophical Transactions, vol. 46, &c.

It is not only possible to dispense with gastroraphe, in the treatment of wounds of the abdomen, it has even been manifested, that this operation has sometimes occasioned very bad symptoms. Under certain circumstances, it may, however, be essentially necessary to practise gastroraphe. For instance, were a large wound to be made across the parietes of the abdomen, a suture might become indispensably necessary to prevent a protrusion of the bowels. Yet, even in this case, the sutures should be as few in number as possible.

EXTRAVASATION IN THE ABDOMEN.

An occasional consequence of a wound, piercing any of the parts contained in the bag of the peritoneum, is an extravasation of a fluid among the surrounding viscera.* This fluid may be undigested aliment, chyle, pancreatic juice, feces, bile, urine, blood, &c. according to the nature of the injured part.

There are three distinct and successive classes of bad symptoms, resulting from the effusion of blood in the abdomen.

1. The first class depends on the loss of blood itself, and consists of paleness, faintness, sinking pulse, and swooning.

2. The second arises from the presence of blood in the cavity of the peritoneum, and consists of a swelling of the abdomen, and sundry inconveniences produced by the pressure of the ex-

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* A modern writer, who endeavours to make effusion of the intestinal contents appear a much less frequent occurrence, than has been generally supposed, represents the following as the only circumstances, in which the event can happen: "If the gut be full, and the wound extensive, the surrounding pressure is overcome by the natural action of the bowel tending to the expulsion of the matters. But, in defect of either of these states, effusion cannot follow. When, however, air has escaped from the bowel, or blood has been extravasated in quantity within the abdomen, at the time of the injury, the resistance opposed to effusion will be less effectual, although the parietal pressure is the same, as such fluids will yield more readily, than the solids naturally in contact." See an Enquiry into the Process of Nature in Repairing Injuries of the Intestines, &c., by B. Travers, p. 25, 26.

According to this gentleman, effusions more generally follow ruptures of the bowels by blows, or falls, upon the belly, than ordinary penetrating wounds, p. 36.

travasated blood on the viscera. If the quantity of blood be small, the inconvenience will be so slight as not to be noticed.

3. The third is produced by the irritation of the blood in the abdomen. But, this irritation can only arise from the putrefied state of the extravasated fluid, when the external air has free access to it. In whatever way its presence irritates, we sometimes see local pain, spasms, fever, inflammation, hiccough, vomiting, suppuration, and sometimes swelling, and a fluctuation, the effects of its lodgment in the cavity of the abdomen.

Extravasated urine, bile, and the contents of the stomach and intestines, produce a higher and more rapid degree of irritation, than effused blood.

But, whatever is the nature of the fluid extravasated in the abdomen, the chief consequences are of the third description, and are all of the inflammatory kind, inducing the hazard of suppuration and gangrene. The irritation, arising from the quality of the effused fluid, and the pressure and distention, resulting from its quantity, are sufficient to account for the origin of such mischievous effects.

The symptoms, caused by wounds of parts contained in the abdomen, may either appear immediately, or not till after a certain time, and they are of two kinds, local and constitutional.

The ordinary constitutional symptoms are, spasm, weakness, fever, vomiting, anxiety, oppressed respiration, &c. The local consist of pain and tumefaction.

When these symptoms appear soon after the wound, and, after a time, gradually diminish, or go off entirely; but, sooner or later, originate again, there is reason to consider their first occurrence as the immediate effect of the injury; their second, as the effect of an extravasation.

Yet, this plan of decision may, sometimes, lead to error. When urine and bile are extravasated, the symptoms of extravasation arise very early, and often continue from their commencement extremely urgent, and without any intermission of mildness.

In such cases, the local pain, swelling, and fluctuation, often afford ample information, and the latter symptom is particularly decisive when it precedes the pain.

In certain instances, the escape of some of the extravasated fluid, out of the external wound, conveys instruction to the practitioner.

It has already been noticed, that all the parts contained in the abdomen are in close contact with each other, and with the inner surface of the peritoneum. Hence, extravasation ii frequently prevented altogether, and when it does happen, is seldom so extensively diffused, among the exterior surfaces of the different viscera, as might a priori be apprehended, the effused matter commonly lying all in one mass. The pressure of the elastic bowels, of the diaphragm, and abdominal muscles, not only frequently presents an obstacle to the wide diffusion of extravasated matter, but it oftentimes propels it towards the external wound.* We can conceive no power capable of overcoming the resistance so produced to the extensive dispersion of extravasated fluids in the cavity of the abdomen. Numerous cases are on record, of persons being stabbed, or shot, through the body, without any evil consequences. The bowels have been supposed, in some of theſe instances, to have eluded the ball, or point of the weapon.† Indeed, it is rational to credit, that this may have been the actual occurrence in a few cases; but, yet it is highly probable, that, in almost all such examples, the bowels were injured, and that an extravasation of the intestinal matter was impeded by the opposite pressure of the adjacent viscera. In many of the cases, the intestines, in fact, were known to be wounded.‡

It has been suspected, that such resistance and pressure may sometimes have occasioned intestinal matter, actually extravasated, to repaſs into the wound of the bowel, and thus be speedily removed. Such copious evacuations of blood per anum, it is said, have followed stabs of the abdomen, as could hardly proceed from the arteries of the intestines.§ However, this mode of an extravasation being got rid of, must be exceedingly rare, compared with that by absorption.

But the adhesive inflammation is a principal circumstance preventing the wide diffusion of extravasated fluids among the viscera of the abdomen. All the surfaces, in contact with each other, and surrounding the track of the wound, become generally so intimately connected together, by the adhesive inflammation, that the wound forms a sort of canal, entirely destitute of all communication with the cavity of the peritoneum. The rapidity, with which such adhesions occur, is often very great.

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* On this subject, I would particularly recommend the reader to consult two essays by M. Petit le Fils, one entitled "Essai sur les Epanchemens et en particulier sur les Epanchemens de Sang;" the other, "Suite de l'Essai sur les Epanchemens," in Mém. de l'Acad. de Chir. tom. 2 and 4, 12mo.

† "It frequently happeneth, that a sword passeth through the body, without wounding any considerable part." Wiseman.

‡ Recoveries of this sort are recorded in Wiseman's Surgery, p. 371, Œuvres de Paré, liv. 10, chap. 35; La Motte, Traité Complet de Chir. Albucasis, lib. 2, cap. 26; Ravaton, Traité des Playes d'Armes à Feu, chap. 6, &c. &c.

§ Richter's Anfangsgr. der Wundarzn. band 5, p. 35.

When the extravasation takes place in a certain degree, at the moment of the wound, the effused fluid often becomes, in a very short time, shut up in a kind of cyst, in consequence of the adhesive inflammation having united all the surrounding surfaces to each other.

Sometimes, however, the extravasation is diffused in various degrees over the abdomen, owing to the patient being subjected to a great deal of motion, or to violent spasmodic contractions of the intestines, arising from the irritation of the extravasated matter. Urine and bile are more frequently extensively dispersed among the convolutions of the viscera, than blood.

TREATMENT OF EXTRAVASATIONS.

When an extravasation is perceived, in the first instance, a part of the wound is to be left open, and the posture of the patient is to be so regulated as to make the wound as depending as possible, in order to promote the escape of the effused fluid. In case it is not perceived till after the wound has been dressed, it is directed to remove the means employed to close a part of it, and to place the patient in a proper posture, with a bandage applied round the body. Should internal hemorrhage still prevail, there are no measures so efficacious, as cold washes, and venesection.

According to surgical writers, when symptoms of irritation exist, attended with local inflammation, pain, and a fluctuating tumor, denoting the seat of the extravasation, the effused fluid is to be evacuated by a puncture.*

When there are no symptoms to denote the exact seat of the extravasation, the employment of antiphlogistic means, a suitable posture, and the introduction of a tube into the wound, are the only measures, to which we are advised to have recourse, For my own part, I would restrict the plan of treatment to averting inflammation, as in this circumstance, no benefit can be derived from posture, or from a tube, which does not actually reach the effused fluid, and the former must often be irksome, the latter always irritating. Venesection should be freely and repeatedly performed; the belly fomented two, or three times a day; and the patient allowed nothing but small quantities of light fluid nourishment. A bandage, applied rather tightly round the body, ought not to be omitted, as it is a certain mode of promoting that compact state of parts contained in the abdomen, by which the ill consequences of extravasations are so materially diminished.

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* Richter's Anfangsgr. der Wundarzneykunst, band 5, p. 38.

When the situation of the effused fluid is not precisely known, the case is dangerous; but, not hopeless. Sometimes, by pressing the intestines a little backward from the wound, if it be large enough for this purpose, the extravasated matter has an opportunity to escape. In other instances, it does not find an exit till suppuration has taken place, and the abscess has burst. Occasionally, it makes its way into the alimentary canal, by exciting ulceration, and is discharged per anum.

Urine, bile, and intestinal matter, extravasated in the abdomen, occasion dangerous inflammation, and not unfrequently gangrenous mischief. If we are to credit the observations of Richter, no measure affords the patient any material chance of preservation, but a timely evacuation of these effusions. The antiphlogistic plan alone is stated to be quite ineffectual, and even the discharge of the extravasated fluid will not avail, unless speedily practised; for, after the inflammation has attained a certain pitch, gangrene becomes inevitable.

When the extravasation is situated near the external wound, the surgeon must endeavour to make a way for its escape, by gently separating the bowels from each other, and the peritoneum, by means of a probe, or his own fingers. The wound may even be enlarged to promote this object.

When the extravasation is situated remotely from the external wound, an opening must be made with a trocar, or a scalpel, and at a depending part. The trocar is the most eligible instrument in cases, in which the extravasation is thin and limpid, the swelling large, and the fluctuation distinct.

When the extravasated matter is not very fluid, as for instance, excrement and coagulated blood; when the swelling is not very prominent, and the undulation not quite plain; it is safer and more effectual to employ a scalpel.

WOUNDS OF THE INTESTINES.

Vomiting of blood, or discharge of it by stool; the escape of fœtid air, or of intestinal matter from the external wound; an empty, collapsed state of a portion of bowel protruded at the aperture; are the ordinary visible symptoms attending a wound of the intestine. When the wound happens to be situated in the protruded portion, it is then obvious to the surgeon's eye; but, when the injury has occurred at a part of the intestinal canal, situated far within the abdomen, the nature of the case does not manifest itself at all, unless an extravasation happen.

The surgeon may adopt three different lines of conduct in the treatment of a wounded intestine. 1. He may endeavour to unite the breach of continuity in the bowel with a suture. 2. He may endeavour to form an artificial anus. 3. Lastly, he may only employ general means, and trust the rest to nature.

The circumstances, which ought to determine the choice, are our next consideration. When the wounded part of the bowel is protruded, the suture is to be made use of, before the part is reduced.

When the wound of the intestine is situated within the cavity of the abdomen, a suture is impracticable, and, except general means to avert inflammation, nothing can be done.

The true object of applying a suture to a wounded intestine, is not to procure an union of the edges of the wound to each other, by making them touch at every point; nor is it designed to prevent the escape of air, and intestinal matter, from the cavity of the bowel into the bag of the peritoneum. The thin, moveable membranous edges of the wound of the bowel would render such aims quite nugatory, unless such numerous stitches were employed, as might themselves prove the cause of sloughing,* rather than the means of promoting a permanent cicatrization of the intestinal wound. A breach of continuity in an intestine is never repaired by the growth of the opposite edges of the wound to each other. The inflammation, which regularly ensues, occasions an adhesion of the adjacent viscera to the wounded portion of intestine, and thus the breach in it becomes closed. The only true object of applying a suture to a wounded bowel, is to confine the injured part closely behind the external wound by means of the ligatures, in order that any extravasated matter may find its way out of the external aperture, and not into the abdomen.

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* It seems proper to mention, however, the following conclusion, drawn by Mr. Travers: "The union of a divided bowel requires the contact of the cut extremities in their entire circumference, effectively to resist the muscular action opposed to an artificial connexion during the process of union. The species of suture employed is of secondary importance, if it secures this contact." On Injuries of Intestines, &c. p. 134.

This observation would authorize stitching wounded bowels much more than is necessary, or justifiable, as far as I am enabled to judge from the evidence adduced. If injuries of the bowels are repaired by the process alluded to above, an attempt to unite one end of the intestine directly to the other can never be our design. It is true, we should endeavour to keep the edges of the breach from being considerably apart, a thing, that the mesentery itself, aided by a stitch or two will always naturally effect; but it is to the adhesions, which the injured bowel contracts to the surrounding parts, that we must chiefly look for the re-establishment of the continuity of the canal.

When the wound of an intestine is situated within the abdomen, remotely from the external wound, no suture is practicable. The surgeon seldom knows, at first, that the bowel is injured; for the matter, extravasated from its cavity, does not appear at the wound; and, when the extravasation is afterwards discovered, it would be impossible to get at the wound of the intestine, on account of the adhesions, which are very quickly formed.

Even if the wound of the intestine were discovered on its first occurrence, no suture could be applied to it, without enlarging the external wound, searching for the wounded bowel, and drawing it out of the cavity of the abdomen. By these steps a wound, which might not previously be dangerous, would very probably be converted into a mortal one.

When the wound of the intestine is first detected, on the occurrence of an extravasation, a few days after the accident, the discharge of the effused fluid is the only thing to be done. A suture for the wound of the bowel is unnecessary, as the adhesive inflammation has already fixed the part in its situation, and the aperture in it is closed in the manner already explained.

When the wound of the intestinal canal is situated in the abdomen, closely behind the inner wound, the employment of a suture is also unnecessary, as the contents of the gut are discharged through the external aperture, and there is no reason to fear a diffusion of them among the viscera, if care be taken to keep the external wound open. There is also no cause to fear, that the wounded bowel will change its situation, and become distant from the outer wound. Nothing, except violent motion of the body, could cause so unfavourable an accident, and this ought always to be avoided. The adhesions, which take place in the course of a day or two, at length, render it impossible for the bowel to vary its situation.

When the wounded part of the intestinal canal is protruded, there is no difficulty in applying a suture to it. The object of this suture is, as I have already noticed, to prevent the wound of the bowel from becoming very distant from the external wound, and, thereby, to diminish the chance of any extravasation among the viscera. The wound of the bowel may be sewed up, the part reduced, and the ends of the ligatures left hanging out of the external wound, and, by their means, the injured intestine is to be confined closely to the aperture in the peritoneum. When the whole intestine is not nearly cut through, a single stitch is usually sufficient, and not much inconvenience can be apprehended from its irritation.*

A fine round needle, threaded with fine thread or silk, is the most proper to be used.

When the wound in a protruded bowel is very small, surgical authors are much divided in opinion, as to the proper practice. Small wounds of the intestines, (says one eminent writer) that do not exceed in size the diameter of a goose-quill, should by no means be stitched, but are best left to nature. If they are left to themselves, they will frequently unite much sooner, than if they are irritated by the suture; for, stitching usually brings on great pain, inflammation, and other bad symptoms. Therefore, it will be much better to return the intestine instantly, bleed the patient, and enjoin rest and abstinence.† Dionis, Garengeot, Sharp, and Sabatier, all coincide with Heister. On the other hand, Le Dran,‡ and B. Bell,§ advise small wounds of the intestines to be sewed up. To this counsel Mr. Travers also leans, as he is in favour of passing a ligature round the wound, and then cutting off the ends of the thread, by which means it may be discharged directly through the bowels, and not interfere with the healing of the external wound.||

When a protruded portion of the intestinal canal is cut quite through the whole of its diameter, Ramdohr's method may appear plausible: he cut off a large part of a mortified intestine, and, inserting the upper end of the bowel, distended with a bit of candle, into the lower, tied them together, and reduced them, taking care to keep them near the external wound with the ligature. The plan was attended with complete success.¶

Moebius, from whom we have received the account of Ram-

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* M. La Peyronie is entitled to the honour of first proposing this rational practice, chiefly, however, in cases of hernia with gangrene, where it seems less proper. It should be noticed also, that he brought the ends of the bowel together, by passing a ligature through the mesentery, so as to produce a fold in that membrane. See "Obs. avec des Reflections sur la cure des Hernies avec gangrene," in Mém de l'Acad. de Chir. tom. 1, p. 337.

† Heister's General System of Surgery, vol. 1, p. 72.

‡ Operat. de Chirurg. p. 80.

§ System of Surgery, vol. 2, chap. 3.

|| On Injuries of Intestines, &c. p. 178.

¶ Moebius in Haller's Disput. Anat. vol. 6; Obs. Med. Miscel. 18.

dohr's operation,[*] attempted to repeat the experiment on a dog; but, the contraction of the muscular fibres of the bowel, and the smallness of the canal, made the endeavour fail. In truth, some strong practical objections are to be urged against this mode of proceeding. The first is, that the surgeon seldom has it in his power to ascertain at once, which is the upper, or which the lower end of the intestine; a material circumstance to be known; and, yet, for the discovery of which, the bowel must remain exposed a dangerous length of time. The mesentery opposes the insinuation of one part of the gut into the other, and, if that membrane be divided, as has been proposed, a dangerous and fatal hemorrhage, within the abdomen may ensue.[†]

Dr. Smith, of the Philadelphia Medical Society, tried Ramdohr's operation on a dog; but, found it impracticable, in consequence of each end of the divided bowel becoming inverted.[‡]

After what has been observed, it does not appear necessary to expatiate on various refinements of this operation; as using a cylindrical piece of card, the trachea of a calf, or a cylinder of isinglass, &c. instead of the candle.

Another method, which was proposed by M. Littre,[§] was directed entirely to the formation of an artificial anus, by confining the upper end of the divided intestine in the external wound. This plan is truly unworthy of imitation; for, to say nothing of the disgusting affliction of an artificial anus, it is a state always much exposed to serious and dangerous inconveniences, such as a prolapsus, or intussusception of the gut; an irremediable marasmus arising from the preternatural shortness of the alimentary canal, &c.

Although sutures may be necessary in recent wounds of the intestines, attended with protrusion, they are certainly wrong means in cases of mortified bowels. In the latter instances, adhesions have always been formed, and on these, the patient's safety materially depends. Drawing out the ends of the intestines, in order to fasten them together with a suture, would inevitably destroy and break these adhesions, which are of such infinite utility.

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[*] Although this method is named after Ramdohr, it has been described by several ancient writers, particularly Guy-de-Chauliac.

[†] "Mais d'autres inconvéniens plus graves se présentent, tels que l'hémorrhagie dépendante de la section des vaisseaux mésentériques. En vain le professeur Boyer lia sept ou huit de ces artères, son malade périt avec un épanchement de sang dans le bas-ventre." Richerand, Nosographie Chirurgicale, tom. 3, p. 333, edit. 2.

[‡] Inaugural Thesis.

[§] Mém. de l'Acad. des Sciences, année 1700.

Sometimes, only one end of the divided gut protrudes at the wound, and the other lies in the cavity of the abdomen. If the other end cannot be found, without enlarging the wound, I question, whether the urgency of the case does not warrant the practice. If the upper end should happen to be concealed in the abdomen, certain death must result from its continuance there. If it be the lower one, and no attempt be made to find it, the patient can only survive with the loathsome affliction of an artificial anus.

With regard to the constitutional treatment, in cases of wounded intestines, it is necessary to say only a few words.

The principal indication is to prevent a dangerous degree of inflammation, and, therefore, the rigorous adoption of the antiphlogistic plan of treatment is indispensable. Let not the surgeon be deterred from employing it, by the apparent debility of the patient, his small contracted pulse, and the coldness of his extremities; symptoms, common to acute inflammation of the bowels, and requiring repeated venesection. Wounds of the small intestines are attended with more vehement inflammation, than those of the large ones. All flatulent, stimulating, and solid food, is to be avoided. The bowels are to be daily emptied by means of clysters, in order that no matter may be allowed to collect in the intestinal canal, so as to create irritation and distention. When excrementitious matter is discharged through the external wound, it is highly necessary to clean and dress it very frequently. It is useful, also, to make gentle pressure with the fingers, at the circumference of the wound, at every time of dressing, in order to promote the exit of any extravasated fluid.

The patient should always lie in such a posture, as will render the external wound depending.

The threads of the suture may be removed on the fifth or sixth day, when the adhesive inflammation has always so united the intestine to the vicinity of the outer wound, that there is no danger of its altering its situation. It is highly wrong to allow the threads to remain till no more extravasation appears in the wound, nor should the surgeon fear letting the wound close.

If the case should terminate favourably, the intestine generally undergoes a diminution in its diameter at the place, where the wound was situated. When this is inconsiderable, the patient occasionally experiences colic pains at the part, especially, after eating such food as tends to produce flatulence. As these pains usually quite go off, after a time, and no inconvenience remains, it is probable, that the intestine may recover its wonted capacity. A more considerable constriction of the intestines, at the situation of the wound, has sometimes been known to give rise to a fatal *miserere*. Even the intestine itself has been known to burst in this situation, after its contents have accumulated behind the contracted part. Patients, who have had wounds of their intestines healed, should afterwards be particularly careful not to swallow any hard substances, nor indigestible, flatulent victuals.*

Sometimes, the contents of the intestines continue to be discharged through the wound, so that either a fistula, or an artificial anus, is formed. There is reason to apprehend the formation of a fistulous opening, when an intestine has been injured by a ball, when it has been quite cut through, or is in a mortified state. But, numerous cases have evinced, that this is not invariably the consequence, and that a perfect cure has frequently followed each of these occurrences.

When an intestine is completely cut through its whole diameter, the upper end being exposed, and the lower inaccessibly concealed in the cavity of the abdomen, there is a necessity for promoting the formation of an artificial anus. For this purpose, the extremity of the intestine is to be attached with a fine suture to the edges of the external wound. For the purpose of distinguishing the upper end of the intestine from the lower, we are directed to give the patient something to drink, and observe whether it issues, after a certain time, from the mouth of the gut. Until this point is ascertained, the surgeon is unwarranted in practising a suture; for, if the upper end should be situated in the abdomen, the surgeon, perhaps, ought to adopt the plan of enlarging the wound to search for the part, as it is the only means of affording the patient a rational chance of preservation.

Gunshot wounds of the abdomen are scarcely ever attended with protrusion of the intestines. In these cases, the treatment is limited to the employment of general means, which have sometimes had the happiest effect.

When a ball has left two openings, from which intestinal matter escapes, they are both to be kept from closing too soon. When, however, there is no discharge of feces, or chyle, from one of them, it is to be allowed to heal.†

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* Richter's Anfangsgr. der Wundarzneykunst, band 5, p. 52.

† Richter lib. cit. p. 54.

Balls, shot into the abdomen, are occasionally discharged with the stools.*

Wounds of the parietes of the belly, after being healed, are apt to be followed by herniæ, on the patient resuming his usual exercises. Numerous cases, proving the truth of this observation, are recorded in the annals of surgery.† Hence, surgical authors advise the cicatrix to be constantly supported with a proper bandage.

CHAP. XLIII.

PSOAS ABSCESS.

THIS signifies a collection of matter, which usually forms behind the peritoneum, in the cellular substance surrounding the psoas muscle. The origin of this malady is not, in general, attended with any symptoms of acute pain and inflammation, nor with any febrile disturbance of the constitution. There is a dull uneasiness in the region of the loins; but, this, so far from leading to a suspicion of the nature of the disease, is usually regarded as rheumatic. The matter is formed slowly, and imperceptibly, and occasions, at first, no manifest swelling, nor fluctuation, and no material symptom whatever, excepting the uneasiness in the loins, and a slight weakness of the thigh and leg on the affected side.

While the abscess occasions no external tumor, the diagnosis is always difficult, and any opinion, founded on the existing symptoms, is very undeserving of implicit confidence.

The outward swelling, at length occurring, may take place in various situations. For the most part, the matter descends, by its own gravity, in the course of the psoas muscle, passes forward under Poupart's ligament, and occasions an external, fluctuating tumor, quite free from pain and inflammation. The exemption from the latter circumstances is a clear indication, that the matter is not originally formed at the place, where it first makes its appearance. The enlargement of the swelling, when the patient draws in his breath; its diminution in an horizontal posture, and on pressure being made; and, lastly, the fluctuation perceptible to the surgeon's fingers, when the patient coughs, are circumstances, which, combined with the other preceding complaints, clearly evince the nature of the case.

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* See an interesting fact of this kind recorded in Schmucker's Vermischte Chirurgische Schriften, band 2, p. 148.

† See Richerand's Nosographie Chirurgicale, tom. 3, p. 322, edit. 2. Schmucker relates a case, which followed puncturing an abscess of the abdomen with a lancet, Vermischte Chirurgische Schriften, band 1, p. 197. See also a case by Wardrop, in A. Cooper's work on Crural and Umbilical Hernia, p. 60.

The swelling in the groin seldom becomes exceedingly large, because the matter in general soon insinuates itself beneath the femoral fascia. In some instances, it descends as far as the knee, and forms there a prominent swelling. Sometimes, the matter makes its way downward into the pelvis, and occasions a swelling in the neighbourhood of the anus. Sometimes it tends towards the loins and sacrum, giving rise to a swelling just where abscesses often make their appearance in the disease of the hip joint. In a few instances, the matter causes a swelling in the vicinity of the vertebræ; and, less frequently still, it makes its way through the abdominal muscles, and occasions a tumor at some part of the abdomen.

The disease, even before it bursts, or is opened, is frequently attended with loss of appetite, weakness, nocturnal sweats, and other hectical complaints.

Lumbar abscesses are sometimes attended with a carious state of the vertebræ. The affection of the bones is by some considered as a cause; by others, as an effect of the rest of the disease.

The causes of the psoas abscess are frequently involved in great obscurity. Sometimes, the disease has been preceded by a violent strain of the loins; but, very commonly, we cannot trace any valid reason for the occurrence of the malady.

TREATMENT.

In considering suppuration, I have recommended, as a general rule, liable to particular exceptions, that acute abscesses ought to be allowed to burst spontaneously. With respect to chronic abscesses, an opposite piece of advice seems proper, and surgeons may generally decide to open them, as soon as their existence is known. If not opened, they do not make their way through the skin for a a very long time, during which period, the quantity of matter is continually increasing, and the cavity of the cyst becoming larger and larger. Psoas abscesses cannot be opened before the swelling occurs, on account of their very deep situation, and the difficulty of knowing, with certainty, of their existence. But, as soon as a swelling and fluctuation have become evident, the sooner the matter is discharged the better.

Experience shews, that when a psoas abscess is opened in the common manner, death in general follows sooner, than when the swelling is allowed to burst of itself. The formation of a large opening, but, particularly, the aperture being afterwards left unclosed, occasions an inflammatory affection of the whole cyst of the abscess, and the most violent description of constitutional disturbance. The discharge is profuse, and its quality becomes thin and fetid. The patient's pulse becomes small, rapid, and irregular; copious perspirations, unremitting diarrhœa, and even delirium ensue, and death very commonly closes the scene.

Hence, several practitioners* declare in favour of letting lumbar abscesses burst spontaneously. But, though I must assent to this practice being better, than making a large puncture, and leaving it open, yet, I have to remark, that, whoever expects the symptoms to be mild on the abscess bursting of itself, will, in general, be egregiously deceived. Violent irritation of a hectical constitution usually ensues, and the patient mostly falls a victim.

On the other hand, I have had so many opportunities of appreciating the practice, recommended by Mr. Abernethy† in these cases, that I must consider it, in the present state of surgery, as the only one warrantable. By it, the severe symptoms, under which patients used formerly to perish, when the abscess burst, or was punctured, and the opening left unclosed, are for the most part eluded, and recoveries are rendered more frequent.

This gentleman's method is to open the tumor with a broad abscess lancet, observing to introduce the instrument somewhat obliquely. This wound is generally sufficient for the discharge of coagula, which are very commonly blended with the contents of lumbar abscesses.

The abscess being completely emptied, the lips of the orifice are to be brought together by means of lint and sticking plaster, in the same way as after phlebotomy, and a compress and bandage are then to be applied. The wound generally heals without giving any trouble.

The matter of course collects again, and, regularly as it is secreted, descends to the lower part of the cyst, on which account the upper part of the cavity will remain a good while undistended, and have an opportunity of contracting. When the integuments are again sufficiently elevated to allow a puncture to be made, without hazard of wounding the subjacent parts, the abscess is to be emptied again, and the wound healed, just in the manner above described. Thus the operation is to be repeated as often as may be necessary.

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* Pearson in his Principles of Surgery, p. 112. Pelletan in his Clinique Chir. tom. 3, p. 322.

† On Chronic and Lumbar Abscesses, in Surgical Works, vol. 2.

By this method, the cyst of the abscess, particularly its upper portion, is not allowed to be distended, and its cavity gradually diminishes in size.'

In conjunction with this treatment, attempts may be made to promote the absorption of the matter by electricity; giving two or three times a week a scruple of zincum vitriol. as an emetic; and by blistering the integuments. Care should be taken not to apply the blister at a part, where it may be necessary to make a puncture in the abscess. A discharge should be kept up from the blistered surface by the savin cerate. When there is reason to suppose the vertebræ diseased, issues are sometimes beneficial.

When the abscess seems disposed to burst by ulceration, the event may sometimes be prevented by a timely puncture at a part of the tumor, where the integuments are free from inflammation.

CHAP. XLIV.

PARACENTESIS ABDOMINIS.

THIS operation consists in making an opening into the cavity of the peritoneum, for the purpose of discharging the fluid collected there in dropsical cases.

The proper instrument for making the opening is a trocar, with a canpula, through which the fluid can readily escape.

Until very lately, it was the invariable practice to introduce the instrument at the central point of a line, drawn from the umbilicus to the anterior superior spinous process of the os ilium, and, on the left side, in order to avoid all risk of injuring the liver.

Modern practitioners usually prefer making the puncture in the linea alba for several weighty reasons. The first is, that, in the other method, you are not sure of introducing the instrument in the exact situation of the linea semilunaris, and consequently may unnecessarily wound the thick muscular parietes of the abdomen, instead of merely a thin tendinous part. Another reason is, that the epigastric artery has sometimes been wounded by very skilful men, when they have attempted to tap in the linea semilunaris. In dropsical cases, the rectus muscle is frequently much broader, than in a healthy subject; and, as it always yields to the distention of the fluid in a greater proportion, than the lateral layers of muscles, the above mentioned measurement is very likely to cause the wound to be made near the course of the epigastric artery.

When the operation is to be performed in the linea alba, the instrument should be introduced about two, or three inches below the navel.

As soon as the trocar meets with no further resistance, it is not to be pushed more deeply, without any object, and with a possibility of injuring the viscera. The stilet is now to be withdrawn, and the fluid allowed to escape through the cannula.

In consequence of the sudden removal of the pressure of the fluid from the viscera and diaphragm, patients are very apt to swoon, and even become affected with extraordinary and most dangerous symptoms. To prevent these unpleasant occurrences, the abdomen is to be compressed with a bandage, or belt, during the discharge of the fluid, and is to be afterwards covered with a flannel compress, and a roller, applied in rather a tight manner.

CHAP. XLV.

HERNIÆ.

BY the term *hernia*, surgeons ordinarily imply a preternatural tumor, occasioned by some of the viscera of the abdomen being displaced out of that cavity.

The disease in common language is called a *rupture*; and this appellation seems to have proceeded from an erroneous idea, formerly entertained, that the case was always attended with a laceration of the peritoneum. The moderns, with more accuracy, insist, that, in ordinary cases, there is only a dilated state of the parts, in which a hernia is included.

In general, those viscera of the abdomen, which are the most moveable, are the most liable to protrusion. Hence, the omentum and intestines, which are loose and unfixed in the cavity of the belly, are met with in almost every hernia, while the stomach has seldom been observed in such a tumor, and, still more seldom, the spleen* and liver. The pancreas and kidneys are also too much fixed ever to be propelled outward. The liver, being connected with the diaphragm, is not subject to complete displacement, though a portion of it has been noticed in large herniæ at the navel.† The uterus,‡ ovaries,§ and bladder,|| have been seen protruded in unusual examples.

But, putting out of present consideration less common cases, in which few of the abdominal viscera have not been more or less protruded, I wish it to be understood, that the usual contents of a hernia are either a portion of intestine, or omentum, or of both these parts together.

When intestine alone is contained in the hernia, the case is termed an *enterocele*; when omentum alone, *epiplocele*; and when both are included in the tumor, it is named an *entero-epiplocele*.

When a hernia contains a part of the stomach, liver, bladder, &c. it is sometimes named accordingly, *gastrocele, hepatocele*, and *cystocele*.

Besides this division of herniæ into several kinds, deduced from the nature of their contents, there are other surgical distinctions, derived from their situations. Thus, when any of the contents of the abdomen slip through the abdominal ring into the groin, the case is termed a *bubonocele*, or *inguinal hernia*; and when the parts descend lower into the scrotum, or labia pudendorum, the hernia is called an *oscheocele*. The name of *femoral*, or *crural hernia*, is applied to that, which occurs below Poupart's ligament, and is most frequent in women. When any of the abdominal viscera are protruded at the navel, the tumor is termed an *umbilical hernia*, or *exomphalos*. The hernial tumors, manifesting themselves below the pubes, near the

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* Ruysch, Advers. Dec. 2.

† Gay, Nourse, and Bohnius, see Pott's Chirurg. Works, vol. 2, p. 121, edit. 1808.

‡ Chopart and Desault, Traité des Mal. Chir. tom. 2, p. 3; also Ruysch, Hildanus, and Sennertus.

§ Pott, vol. 2, p. 126.

|| See particularly Récherches sur la Hernie de la Vessie par M. Verdier, in Mém. de l'Acad. de Chir. tom. 2; Pott's Works, vol. 2, p. 206. edit. 1808; Mery, Obs. sur differentes Maladies, in Acad. Royale de Sciences, an. 1713; Ruysch, Obs. Anat. Chir. Centuria, Obs. 98; Keate's Cases of Hydrocele, &c. &c.

attachment of the superior head of the triceps and pectineus, are called *herniæ of the foramen ovale*. Sometimes, the hernial tumor projects into the vagina, and is therefore named a hernia of this part. Others, appearing at any other part of the abdomen not mentioned above, are called *ventral herniæ*.

One very particular case is termed *hernia congenita*. It exists from the time of birth, and in it some of the abdominal viscera are actually lodged in the tunica vaginalis, in contact with the testicle. Haller and John Hunter seem equally deserving of the honour attached to the explanations of the nature of this particular case.* The disease is produced in consequence of a piece of intestine, or omentum, slipping into the tunica vaginalis, before the natural communication, between the cavity of this membrane and that of the abdomen, is obliterated in the young subject.

Mr. Hey has lately discovered a new species of hernia congenita, to which he gives the epithet *infantilis*, as it can only exist, while the parts retain the state peculiar to early infancy. The particularity of the hernia congenita infantilis, consists in the hernial sac being contained in the tunica vaginalis of the testicle. This case differs from the common scrotal rupture, in which the hernial sac lies on the outside of the tunica vaginalis, and, also, from the common hernia congenita, in which the protruded viscera are in contact with the testicle, and have no hernial sac, except the tunica vaginalis.†

In common cases, the contents of a hernia are always included in a complete membranous pouch, which is, in fact, formed of the peritoneum. This membrane, every novice in surgery knows, lines the whole cavity of the abdomen; and when any viscus protrudes out of the belly, it necessarily carries before it a portion of the elastic bag, in which it is naturally included. Such is the simple manner, in which a *hernial sac* is formed. In general, this part is of a thin texture in recent herniæ, and, of a thick structure in old cases. However, sometimes, when the hernia is very large, the hernial sac grows thinner, instead of becoming thicker, in proportion to the size and duration of the tumor. This diminution of the thickness of the sac and more external parts, may take place in so considerable a degree, that the convolutions, and vermicular motion, of the bowels may be distinguished through the skin. The contents of a rupture may also lie immediately under the integuments, when the hernial sac has been burst by a blow.*

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* See Haller's Programma, herniarum observationes aliquot continens, Goettingen 1749. His Opuscula Pathologica, and also Opera Minora, tom. 3. The programma appears to be by far the earliest publication on the subject. Hunter's Med. Commentaries seem not to have made their appearance till 1762.

† Hey's Practical Observations in Surgery, p. 230, edit. 2.

In an epiplocele, as Le Dran observes, there is nothing to be felt, except a doughy softness, which neither absolutely yields to the touch, nor very sensibly resists it.† The tumor has a flabby, unequal feel; and, when there is no stricture, is perfectly indolent. It is more compressible, than that arising from protruded intestine; and when the quantity of omentum is large, the epiplocele may, in some measure, be distinguished by its weight.

In an enterocele, the tumor is usually more flatulent, tense, and elastic. If the intestine be distended with wind, have any degree of stricture made on it, or be inflamed, the swelling will be tense, resist the impression of the fingers, and give pain upon being handled. On the contrary, if there be no stricture, and the gut be neither distended with air, nor inflamed, the tension will be trivial, and no pain will occur upon handling the tumor. When the patient coughs, an enterocele feels, as Mr. Pott observes, just as if it were blown into.‡ When an intestine, containing air, is reduced, it frequently occasions a guggling noise.

In the entero-epiplocele, of course, the symptoms are mixed.

Some herniæ are capable of easy and immediate reduction. This is usually the case, when the aperture, through which the parts protrude, is not so small as to produce constriction, and when these same parts have not contracted any adhesions. In old cases of epiplocele, the omentum frequently cannot be reduced, in consequence of the morbid enlargement, which the protruded portion has undergone, even though its neck may not suffer any degree of stricture.

When herniæ can be reduced by the hand, this ought always to be done; and the patient should afterwards constantly retain the parts in their natural situation by wearing a truss.

Many herniæ are incapable of being reduced, though not in a state of strangulation, or inflammation. The incapacity of reduction, in this sort of case, is commonly owing to the largeness and quantity of the contents of the hernial sac; to a morbid thickening and enlargement of them; and to adhesions, which they have contracted with each other, or with the inside of the sac.

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* A. Cooper's Anatomy and Surgical Treatment of Inguinal and Congenital Hernia, p. 3; Supplement au Traité de J. L. Petit sur les Mal. Chir. p. 113.

† Operations in Surgery, p. 73.

‡ Chirurgical Works, vol. 2, p. 21, edit. 1808.

When a bubonocele is rendered incapable of reduction, in consequence of adhesions, or the largeness of its contents, it fills the scrotum, and displaces the integuments of the penis, in such a degree, that the patient is disqualified for copulation. The course of the alimentary matter is always more or less obstructed, in that portion of the intestines, which composes the hernia; the patient is subject to complaints of the digestive organs, colic pains, or even a total stoppage of the intestinal contents. This last accident may arise from the matter accumulating too copiously in a part of the bowel, that has lost its power of action, so that the collection continues to increase above the obstruction;* or it may be produced by the protrusion of an additional piece of intestine, or omentum, which causes the parts, embraced by the opening, through which the hernia descends, to become strangulated. In this last case, therefore, the viscera suffer a painful constriction, and, not only is the passage of their contents impeded, but, the parts in the vicinity of the incarceration are attacked with inflammation. Persons, afflicted with herniæ, are incessantly exposed to these two dangers, namely, simple obstruction in the protruded bowels, and strangulation of them. The first (called by the French, *engouement*) is frequent in old subjects, and in cases, where the hernia is ancient and voluminous; the second is most common in young people and adults.†

Persons, with irreducible ruptures, should avoid every rough description of exercise; should support the hernial tumor with a bandage, and carefully keep it out of the way of all harm from pressure, bruises, &c. and should be particularly attentive to avoid all irregularity of diet, and costiveness.

As Mr. Pott observes, it is fit, that mankind should be apprised, that the quiet, inoffensive state of these cases is by no means to be depended upon: an inflammation of that part of the gut, which is down; any obstruction to the passage of the aliment, or feces, through it; a stricture, made on it by the opening, through which it protrudes; are circumstances always likely to put the life of the patient into danger.

A stricture, in this case, is more dangerous, than in ordinary instances, because there is hardly a possibility of obtaining relief, except by an operation.‡

An irreducible omental hernia, free from constriction and inflammation, is not productive of much immediate danger; but, it is always apt to induce perilous symptoms, when affected with inflammation from any accidental cause. Such patients may always be considered very liable to a protrusion of a piece of intestine into the sac.

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* This is the *hernie par engouement* of the French, on which case, a few observations will presently be introduced.

† Richerand's Nosographie Chirurgicale, tom. 3, p. 365, 366, edit. 2.

‡ See Pott's Chirurgical Works, vol. 2, p. 49, 50.

Some herniæ are reducible, but not without difficulty, the patient being subjected to a good deal of pain and danger.

The difficulty of reduction, the pain, and the danger, may depend on the magnitude of the piece of omentum, or its inflamed state; the quantity of intestine and mesentery; an inflammation of the gut, or its distention with feces or air; or on the smallness of the aperture, through which the hernia protrudes. But, as Mr. Pott remarks, to whatever cause it be owing, if the prolapsed body cannot be immediately replaced, and the patient suffers pain, or is prevented thereby from going to stool, it is called an *incarcerated* or *strangulated hernia.*[*] The perilous symptoms, attendant on this case, will be presently detailed, as well as the best means for relieving the patient, and avoiding, if possible, an operation. All that I need observe in this place is, that the bad symptoms are entirely dependent on the constriction made on the hernial contents, on the obstruction to the passage of the aliment and feces through the intestinal canal, on the inflamed, and even gangrenous, state of the parts contained in the hernial sac, and on the degree of inflammation affecting the peritoneum and abdominal viscera.

Other herniæ are both strangulated, and incapable of being reduced, without an operation.

SYMPTOMS OF A STRANGULATED HERNIA.

The first symptoms are, a tumor in the situation of the rupture, attended with pain, not only in the part, but all over the belly: sickness, and inclination to vomit; suppression of stools; and some degree of fever. If these complaints are not appeased by the return of the intestine, they are soon exasperated; the sickness becomes, in the words of Mr. Pott, more troublesome, the vomiting more frequent, the pain more intense, the tension of the belly greater, the fever higher, and a general restlessness comes on, which is very terrible to bear. If, in this state, the operation is improperly delayed, the vomiting is soon exchanged for a convulsive hiccough, and a frequent ejection of bilious matter from the stomach ensues. The tension of the abdomen, and the febrile symptoms, having been greatly increased for a few hours, the patient suddenly becomes quite easy, the swelling of the belly subsides, and the pulse, from having been hard, full, and frequent, becomes feeble, and generally irregular. The skin, especially that of the extremities, becomes cold and moist. As Mr. Pott relates, the eyes have now a languor and a glassiness not easy to be described; the tumor of the part disappears, and the skin covering it sometimes changes its natural colour for a livid hue. Whether it keeps, or loses its colour, it has an emphysematous feel, a crepitus to the touch. This crepitus is the sure indication of grangrenous mischief within. In this state, the gut either goes up spontaneously, or is returned with the smallest degree of pressure; a discharge is made by stool, and the patient fancies himself better. This feeling, however, is of short duration; for the hiccough, and the cold sweats, continuing and increasing, with the addition of convulsive symptoms, death soon follows.

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[*] In English, we have no term exactly expressive of what the French call "engouement," a term applied to those cases, in which the intestinal matter in the protruded bowels forms the obstruction.

The stoppage of the fecal evacuations will often occur in as great a degree, and be equally insuperable by purgative medicines, whether only a portion of the diameter of the gut, or a whole circle of it, is strangulated. The constriction of a mere diverticulum has caused an obstinate and fatal constipation.* Hence, as my friend Mr. Lawrence has observed, the obstruction to the passage of the feces does not seem to be so much mechanical, as dependent on the inflammatory affection of the intestines.

CAUSES OF HERNIÆ.

Every motion, exercise, and exertion, in which the abdominal muscles are thrown into a state of powerful action, compress the viscera, diminish the capacity of the abdomen, and must be considered as particularly conducive to the occurrence of herniæ. On such occasions, the bowels necessarily push against the elastic peritoneum, and make it protrude in the form of a pouch, at any point where the parietes of the abdomen do not make sufficient mechanical resistance. But, as in the common occupations and habits of life, the abdominal muscles very often make considerable pressure on the viscera, and only a certain proportion of mankind are afflicted with ruptures, we must conclude, that, in those persons, who are afflicted, there must have existed a want of strength in such parts of the parietes of the abdomen, as are the seat of the hernia. This sentiment is corroborated by the ordinary occurrence of the disease at such places, as seem naturally to present the least resistance to a protrusion of the viscera; for instance, the abdominal ring, and space beneath Poupart's ligament. The opinion is also confirmed by the occasional origin of ruptures in situations, where the peritoneum has been previously wounded.

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* Cases, exemplifying these observations, are recorded by Morgagni, ep. 34, art. 18; Benevoli, Due Relazioni Chir. art. 19; Mém. de l'Acad. de Chir. tom. 3, p. 151, 4to; Med. Obs. and Enquiries, vol. 4, p. 178, and 355; Phil. Magazine, vol. 31, p. 214, &c; See a Treatise on Ruptures by William Lawrence, p. 14, edit. 2. Both to the student and practical surgeon, this last work will be found highly instructive and useful, every part of the subject being well explained, and considered with much judgment, and ability. The references inserted, are truly valuable, as they at once introduce the reader to an acquaintance with all the best writers upon this important branch of surgery.

Some men may naturally have abdominal rings of a larger dimension, and of a weaker fabric, than those of the generality of mankind; and such may be particularly disposed to herniæ. An unusually long mesentery, and omentum, are mentioned by some writers as predisposing persons to the disease.

The doctrine, that eating a good deal of oil, is conducive to ruptures, seems only to deserve a place among the numerous hypotheses, with which the human judgment is incessantly blinded.

In the foregoing chapter, I have related, that penetrating wounds of the abdomen sometimes give rise to the formation of herniæ.

Blows and kicks upon the abdomen have also been observed to produce hernial tumors.*

TREATMENT OF A STRANGULATED HERNIA, BEFORE HAVING RECOURSE TO AN OPERATION.

There is no truth, in the whole body of surgical knowledge, more confirmed by experience, than what is contained in the following passage of Mr. Pott's Treatise on Ruptures: "A hernia, with painful stricture and stoppage of stools, is one of those cases, in which we can seldom stand still even for a short space of time; if we do not get forward, we generally go backward; and whatever does no good, if it be at all depended upon, certainly does harm, by occasioning an irretrievable loss of time." When we reflect upon what parts are wounded by the operator; when we view the operation in an abstract light, and put out of consideration the whole of that constitutional disturbance, which invariably results from the continuance of the strangulation; there seems ample cause to believe, that the generality of fatal events, consequent to the operation, are attributable to the disease itself, and not to the attempt made for its relief. Mr. Hey very justly remarks, that if Mr. Pott's opinion be true, that the operation, when performed in a proper manner, and in due time, does not prove the cause of death oftener, than perhaps once in fifty times: it would undoubtedly preserve the lives of many, to perform it almost as soon as the disease commenced, without increasing the danger, by spending much time in the use of means, which cannot be depended upon.*

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* A. Cooper on Inguinal and Congenital Hernia, p. 13. Where a large portion of the abdominal parietes is weakened by a violent contusion, or the repeated distention of pregnancy, and yields, so as to form a preternatural swelling, containing some of the viscera, the case is named by the French an "éventration."

"Les éventrations, ou hernies ventrales, susceptibles d'engouement, ne le sont pas d'étranglement, tant est large l'ouverture par laquelle les parties s'échappent de l'abdomen." Richerand, Nosographie Chirurg. tom. 3, p. 405, edit. 2.

Indeed, the necessity of having speedy recourse to the operation, as soon as the surgeon has unsuccessfully put into practice some of the most efficacious, and least dilatory, plans of treatment, is indicated by daily experience. This is more particularly the case, since we find it recorded in almost every writer upon the subject, that the intestine is often found in a state of mortification a very few hours after its first protrusion from the cavity of the abdomen.

Hence, in selecting a method of treatment, previously to the operation, it is a matter of the highest importance always to be actuated by a determination to lose no time. The loss of a single hour may launch the patient into a state, from which no skill, no human power, can extricate him. Every surgeon, anxious for his own professional character, or the welfare of his patient, will be cautious to employ only such means, as at once possess the greatest efficacy, do not tamper with an urgent disease, and create no perilous delay in recurring to a timely operation.

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* "Cette opération par elle-même n'est pas si effrayante, ni si dangereuse que le vulgaire le croit; et sa fin assez souvent malheureuse, vient ordinairement parce qu'on la fait trop tard, lorsque le malade est dèja en danger de mourir par la seule inflammation, ou par la gangrene des intestins et des parties voisines." Bertrandi, Traité des Opérations de Chirurgie, p. 21.

Although this observation is strictly true, and coincides with the opinions of the most judicious surgeons of the present time, it is not to be supposed, that the operation is itself attended with no risk of inducing dangerous consequences. The contrary is quite proved, by the severe and sometimes fatal symptoms, which have often been brought on by it, when undertaken for cases, in which no strangulation, inflammation, &c. existed; but, where the sole object was, to get rid of the tumor. See Petit's Traité des Mal. Chir. tom. 2, p. 354—357; Arnaud's Mém. de Chir. tom. 2, p. 453—456; Abernethy's Surgical Works, vol. 1, p. 6, and particularly, a note p. 11, &c. &c.

The taxis, or reduction of the hernial contents by the hand, ought to form the primary object of a surgeon called to an incarcerated hernia. To perform this well in bubonoceles is impossible, without an accurate knowledge of the precise situation of the abdominal ring; and it has often been a matter of surprise to me, that surgical authors, who have generally been tediously particular in relating the mode of performing the taxis, should never have reminded their readers of the great utility of attending carefully to the situation of the opening, through which the hernia protrudes. The projecting point of bone, termed the *angle of the pubes*, is the chief guide to the situation of the ring. The opening lies a little above, and on the inside of this bony prominence, which is very distinguishable in the fattest subject.

The contents of a bubonecele descend through the ring downward and inward, the sac usually lying immediately beneath the integuments, in front of the spermatic cord. In attempting reduction with the hand, all our pressure should be concentrated in the direction upward and outward, so as to press the contents of the hernia towards the ring. The external oblique muscle should be relaxed. For this purpose, the thorax should be elevated, and turned towards the opposite side. Since, also, the femoral fascia, when tense, tightens Poupart's ligament, and may thus, in some degree, straighten the abdominal ring, the thigh should be bent, and rotated inward.

In the femoral hernia, the viscera descend first downward and then outward, and the pressure should, therefore, be made upward and inward. The external oblique muscle should be relaxed and the thigh bent, as in the case of bubonocele. Gimbernat and Mr. Hey have apprised the public, that, in femoral herniæ, the stricture is not made, as was supposed, by Poupart's ligament, but by a band of ligamentous fibres, situated more deeply, to which we shall advert in describing the operation. But, as this band is connected with Poupart's ligament, the relaxation of the latter must necessarily also relax the former part.

Too much violence should certainly never be employed in attempting to reduce the contents of a hernia with the hand. Force can never do good, and it must do immense injury to the inflamed viscera, in the hernial sac. M. J. L. Petit,* and Mr.

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* Supplement au Traité de J. L. Petit sur les Maladies Chir. p. 113.

A. Cooper,* even mention examples of the intestine being burst, by using too much violence.

Some writers have maintained, that when the rupture becomes painful, we are no longer justified in persevering in attempts at reduction by the hand. Certainly, it must be admitted, that all unnecessary and protracted handling of an inflamed hernial tumor ought to be condemned, as tending to increase the inflammation, and accelerate the approach of gangrene. However, were we always to omit making another trial of the taxis, because inflammation of the parts had come on, I believe, that there would often be a necessity for having recourse to the knife, when the taxis, either alone, or assisted by other means, would answer every purpose.

It appears, that Richter has seldom seen a truly incarcerated hernia reduced by the taxis, and, when this operation succeeded, circumstances had been so altered for the better by other means, and the parts returned so easily, and unexpectedly, although all previous trials failed, that this gentleman was always inclined to think, that the hernia would have spontaneously gone up, a few hours afterwards.

Desault also believed, that ruptures, in which the inflammatory symptoms are strongly marked, seldom admit of being reduced by the taxis; and he proves, that long-protracted handling of the tumor has a very unfavourable influence on the event of the case. This celebrated surgeon found, that the operation was less successful in a number of patients, on whom repeated trials of the taxis had been made, than in a similar number of persons, operated on, without these attempts.

I am decidedly of opinion, that the general tenor of the foregoing remarks is perfectly correct, viz.; that handling an inflamed hernial tumor has a very pernicious effect on the state of the parts, and should not be persevered in too long. But I entirely dissent from Richter, who represents the taxis, as being in reality quite a useless proceeding in cases of incarcerated hernia; and, I cannot altogether agree with some other writers, in advising the knife to be employed, whenever the tumor is inflamed.

I have reduced ruptures with my hand, when they have been in a very painful state, attended with every symptom of strangulation.

When manual attempts at reduction have failed, other auxiliary means should be immediately tried. In the opinion of the most experienced men, bleeding, cathartics, clysters, cold topical applications, the warm bath, and tobacco smoke, or decoction, introduced into the intestines, are the most efficacious. Yet, it is not enough to possess this information; for, to render our knowledge likely to be productive of a judicious practice, it behoves us to learn precisely what degree of reliance should be placed upon each of these means, and the exact order, in which they ought to be tried, so as to procure the greatest chance of relief, without occasioning any hazardous delay, beyond that critical moment, at which the operation is most strongly indicated.

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* On Inguinal and Congenital Hernia, p. 3.

When reduction by the hand proves impracticable, I am inclined to think venesection should be immediately practised. The testimony of the best writers is in favour of this plan; and the little time consumed in trying its effect, is another weighty circumstance in its recommendation.

A strangulated hernia is to be regarded as a disease, accompanied with a considerable tendency to inflammation: the impeded functions of the intestinal canal may, and do certainly, produce an alarming disorder of the constitution; but, I cannot help considering the advanced progress of the inflammation in the contents of the hernia, as the most frequent cause of death, the degree of danger being in some degree proportioned to the state of the protruded viscera. Hence, bleeding must also prove useful, by counteracting the inflammatory symptoms.

In very old and feeble subjects, the use of the lancet might certainly be sometimes judiciously omitted; but, in general, venesection must be deemed a prudent measure.

The examination of every subject after death, in consequence of this disease, discloses, that inflammation and gangrene, are almost infallible consequences of the strangulation being continued beyond a certain period. I entertain a firm opinion, that Mr. Wilmer, of Coventry, notwithstanding the bad effects, which he imagined to arise from bleeding, has only offered a visionary and unfounded theory, in explanation of the cause of death in these cases. Had he been entirely divested of prejudice, it would be difficult to conceive, how he could have overlooked the strong and manifest traces of inflammation, apparent in every subject after death. Mr. Wilmer's idea, that bleeding renders the subsequent operation more dangerous, is most ably refuted by Mr. Hey.*

Mr. Alanson thought, that bleeding never promoted the success of the taxis. However, this opinion is contrary to the sentiments of most of the best writers, and experienced practitioners. The authority of Le Dran, Pott, Richter, Callisen, Sabatier, and of numerous other celebrated surgeons, might be adduced.

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* In the hernia attended with mere obstruction (engouement), and not strangulation, bleeding is unnecessary.

In performing the operation, a large opening should be made in the vein, in order that the sudden evacuation of the blood may make the patient faint; for, the taxis is observed to be particularly successful during a swoon. For the same reason, a liberal quantity of blood should be taken away.

Having bled the patient, it becomes advisable to make another attempt to reduce the parts by the hand; and if fainting should occur, this favourable opportunity ought not to be lost.

Too often, however, the hernial contents are not to be released from their incarcerated state by such mild treatment.

I calculate, that half an hour would be amply sufficient for putting into practice what has been above recommended, viz. the attempts at reduction by the hand, and bleeding.

Success not being obtained, I would next recommend the patient to be placed in a warm bath, if one could be speedily provided. But, though I have reduced several herniæ, while patients have been in this situation, and, though I place considerable reliance in its efficacy, so perilous does delay appear to me, in these circumstances, that should any great length of time be unavoidably necessary to prepare the bath, I think it would be most judicious not to remain inactive. The effect of a semicupium being also very uncertain, I would recommend it either to be dispensed with entirely, or to be prepared during the trial of other means. I sincerely hope, that my words convey my meaning; and I repeat my great reliance in the efficacy of the warm bath, on which account, it appears to me worthy of a trial, immediately the taxis and phlebotomy have proved ineffectual. I would only recommend it to be dispensed with, when its employment would unavoidably occasion much delay.

In case a warm bath cannot speedily be prepared, let not the surgeon tamper with a disease, so urgent in its nature, so rapid in its progress, and so often fatal from the inert and timorous conduct of the practitioner. Let him not, at all events, consume any material time in trying the effect of clysters and cathartics. The utility of the latter, in cases of enterocele, may be very rationally questioned. Every one, however, will admit, that, in cases of inflamed epiplocele, they must be beneficial, and ought to be administered.

In every instance, in which there is reason to believe the strangulated hernia to be of the intestinal kind, no sooner have the repeated attempts at reduction with the hand, assisted by bleeding, and the warm bath, failed, than the surgeon should immediately try the united effect of cold, applied to the tumor, and of a tobacco clyster, or its fumes, introduced into the large intestines. Snow, or ice pounded, and mixed with salt, and put into bladders, should be applied to the swelling. In case these substances could not be obtained, the evaporation of æther, or spirits, from the surface of the swelling, might be tried as a substitute.

Some practitioners prefer tobacco fumes; others the decoction, injected into the rectum. The latter seems to me the most eligible, because the smoke apparatus is frequently out of order, or cannot be immediately obtained. In preparing the tobacco clyster, it is very wrong and unnecessary to lose half an hour in infusing the plant, as is sometimes directed.

℞ Nicotianæ ʒj.
Aq. ferventis ℔j.

The plant may be macerated ten minutes, and the liquor then strained for use. One half should be first injected, and soon afterwards the other, unless the clyster should operate too violently.

Frequently, during the combined action of the ice and tobacco, the contents of the hernia return spontaneously into the abdomen; but, at all events, the surgeon should make another final effort to reduce the parts by the hand. If this again fails, even when the patient has been duly put under the influence of the tobacco, and if the symptoms of strangulation, at the same time, continue to increase, the operation ought undoubtedly to be undertaken, without further delay.

OF HERNIÆ WITH OBSTRUCTION, (ENGOUEMENT), BUT NOT STRANGULATION.

What the French surgeons call "*engouement*," is produced by the accumulation of the intestinal matter in the protruded portion of the bowels. It is most common in old, large herniæ, and depends upon the difficulty, with which the contents of the intestines ascend, against their gravity, so as to pass from the bowels, contained in the hernia, into the rest of the intestinal canal. When substances, like plum or cherry stones, have been swallowed, they pass with slowness and difficulty into that portion of the bowels, which forms the hernia, and which being weakened, and not having its peristaltic action assisted by the alternate action and reaction of the diaphragm and abdominal muscles, is incapable of propelling onward the substances, which have entered it. These lodge in the part; the canal becomes obstructed; the intestinal contents continue to accumulate, in larger and larger quantities, between the stomach and the seat of the obstruction; and the hernial tumor enlarges, being at first almost indolent, soft, and doughy, and not elastic and painful, as in a true case of strangulation. The *engouement*, or simple obstruction of a hernia, is essentially different from incarceration, or strangulation, inasmuch as it may exist, without there being any disproportion between the opening, through which the hernia takes place, and the protruded parts. It is entirely produced by the lodgment of the intestinal contents in a portion of the bowels, that is incapable of emptying itself, either by its own action, or any auxiliary means. In the mean while, the abdomen becomes tense; the tumor grows larger and painful; the patient, who had only been troubled with nausea, now vomits up the contents of the bowels; fever commences; and all the symptoms of strangulation occur in combination with such as originate from the mere obstruction. This latter state, unattended with actual strangulation, may exist several days, and even weeks, without putting a period to life; while, on the contrary, the bowels, when stangulated, inflame, and sometimes become gangrenous in the course of four and twenty hours.

According to the French surgeons, bleeding is seldom of any use in the hernia, accompanied simply with obstruction (engouement). They also disapprove of the employment of emollient applications, unless the contents of the protruded bowels are exceedingly indurated; because, as Monro has observed, such topical medicines, by relaxing the tumor, increase its size, and lessen the contractile action of the intestine. Hence, tonic spirituous applications, cold water, powdered ice, and purgative clysters, are recommended. All these means tend to revive the contractile power of the distended bowel, and the clysters, by emytying the large intestines, also favour the further progress of the contents of the protruded viscera towards the rectum. Clysters, containing the sulphate of soda, or magnesia, are here preferable to those, made with tobacco.

In this kind of case, the attempts at reduction may be repeated several times a day. The disease is very different from a hernia with strangulation; and examples have occurred, in which the obstruction has been got rid of, as late as eight, ten, or eleven days after its commencement. However, if the patient were aged and infirm, Richerand observes, that we ought not to let the afflicted fall a victim to abstinence and suffering, protracted thus long; for, as all nourishment is incessantly vomited up, the weakness, which would be induced, could not fail to render the operation unavailing.

The instant the symptoms of inflammation begin to shew themselves with those of mere obstruction, (engouement) and the swelling becomes tense, elastic, and painful, the operation is positively indicated, and delay is fatal.*

BUBONOCELE, OR INGUINAL HERNIA.

Of all the various species of hernia, the inguinal is by far the most common.† The existence of the disease, in the unincarcerated and reducible state, is indicated by the following circumstances:

1. By a tumor, which has suddenly occurred in the groin, in consequence of some kind of effort, without being preceded by any symptoms of inflammation.

2. By the diminution, or even total disappearance of the swelling, when the patient lies upon his back; and by its recurrence, when he stands up again.

A few years ago, surgeons appear to have had only imperfect ideas respecting the anatomy of inguinal herniæ: indeed, Mr. Pott's description, which was always looked up to as an authority, is now much less esteemed, than the more accurate account published by that zealous and able improver of surgery, Mr. Astley Cooper.‡ Among other particulars, which I shall hereafter notice, the latter gentleman has explained, that the viscera first protrude at a part, which is situated about an inch and a half from the abdominal ring, in the direction towards the anterior superior spinous process of the ilium. The hernial sac descends through the ring over the spermatic cord, and is covered by a fascia, sent off from the tendon of the external oblique muscle. Beneath this fascia, the cremaster muscle is also situated over the sac. When the hernial sac has descended a certain way, it lies upon the tunica vaginalis, as well as the spermatic cord. The epigastric artery commonly passes between the mouth of the sac and the symphysis pubis. The above eminent surgeon observes, that this vessel runs in some degree under the sac, and along its inner side. There is no vessel of importance either above, or on the outside of this part.

In old herniæ, however, the internal opening of the passage, through which the parts protrude, becomes situated more opposite the abdominal ring. In consequence of the place, where the viscera first protrude, being situated in the above manner, Mr. A. Cooper recommends the pads of trusses to be so constructed as to make pressure upon it.

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* Richerand, Nosographie Chirurgicale, tom. 3, p. 375—378, edit. 2.

† "Les hernies inguinales sont incomparablement plus nombreuses, que toutes les autres ensemble, leur proportion est au moins 8=10." Richerand, Nosog. Chir. tom. 3, p. 355, edit. 2.

‡ Anatomy and Surgical Treatment of Inguinal and Congenital Hernia.

Though the hernial sac commonly lies upon the spermatic cord, it should be remembered, that there are instances recorded, in which the vas deferens and spermatic vessels have been situated in front of the sac,* as well as other examples, in which the hernia was interposed in various ways between the parts composing the cord.†

MARKS OF DISCRIMINATION BETWIXT INGUINAL AND CRURAL HERNIÆ.

I have known very good surgeons sometimes differ in opinion, as to whether certain cases were inguinal or crural herniæ; and occasionally the error on one side was not dispelled, till an operation had thrown light upon the disease. Practitioners may the more easily fall into mistakes of this kind, in consequence of inguinal herniæ being always expected in men, and never in women; while crural ruptures are regarded as a common affliction of females, but a most unfrequent one of males. Deviations, however, from what is ordinary are possible, and should ever be in the recollection of a consummate surgeon. In men, a crural hernia may acquire a very large size, ascend over Poupart's ligament, and project over the abdominal ring. The swelling has then a roundish form, and may resemble an inguinal hernia, that contains only intestine, that is gradual in its increase, and that has not yet descended into the scrotum.

I shall not insist on the likelihood of the mistake being discovered, by the impossibility of reducing such a hernia by pressure, directed from below upwards, in the oblique course of the canal within the abdominal ring. As will be hereafter related, the femoral hernia only admits of reduction, by being pushed first from above downwards, and then perpendicularly with respect to the groin. The relation, which the neck of the tumor bears to the crural arch, will enable the practitioner to distinguish the nature of the cases. If a crural hernia is drawn downwards, the crural arch can be traced extending over the neck of the sac;

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* Le Dran, Traité des Operations, p. 127; Schmucker, Vermischte Schriften, vol. 2, p. 55; A. Cooper on Inguinal and Congenital Hernia, p, 49.

† Hey's Practical Observations in surgery, p. 140, edit. 2; A. Cooper, op. cit. p. 9 and 10; Camperi Icones Hern. tab. 8 et 13.

while, in a bubonocele, it runs under that part. The spine of the pubes, which is behind and below the neck of the sac in an inguinal hernia, is on the same horizontal level, and rather within it, in the crural rupture.*

In women, a bubonocele may be mistaken for crural hernia. A protrusion of the bowels at the abdominal ring, being exceedingly uncommon in females, the surgeon is apt to be less on his guard against an error. The swelling may descend from the ring, and extend over the crural arch, so as to resemble in some measure a femoral hernia, that has mounted over the said arch.

Besides the mode of discrimination already adverted to, it deserves attention, that a bubonocele in women always descends from the abdominal ring, in the direction of the round ligament of the uterus, and tends to the substance of the labium; just as the inguinal hernia in man, follows the course of the spermatic vessels; and falls towards the scrotum. On the contrary, the crural hernia may remain below, or rise over the crural arch; but, its direction is never towards either the labium, or the scrotum.†

CASES, WHICH ARE MOST LIABLE TO BE MISTAKEN FOR A BUBONOCELE.

These are the cirsocele, hydrocele, hernia humoralis, enlarged inguinal glands, the lodgment of the testicle at the ring, hæmatocele, and encysted hydrocele of the spermatic cord.

The method of discriminating the first case is explained in the chapter on cirsocele.

The hydrocele may be distinguished by the perfect equality of the whole tumor; its transparency when a candle is placed behind it; the smallness of the spermatic process; the absence of pain on handling the swelling; the fluctuation of the water; the gradual formation of the tumor; its having begun below, and proceeded upward; its not being affected by any posture or action of the patient, nor increased by his coughing; and, lastly, the absolute impossibility of feeling the testicle at the bottom of the scrotum.

The hernia humoralis may be known by the hardened state of the epidydimis; the exemption of the spermatic cord from all unnatural fulness; the generally preceding gonorrhœa; the pain in the testicle and loins; the weight of the tumor; and the tense, reddish, smooth, shining, uncorrugated appearance of the scrotum.

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* Lawrence, p. 363. edit. 2.

† Pelletan, Clinique Chirurgicale, tom. 3, p. 28.

An indurated gland may be distinguished from a hernia, by its being unconnected with the spermatic cord, and by its circumscribed, incompressible hardness. When it is in a suppurated state, a fluctuation of matter may be felt.

The lodgment of the testicle at the abdominal ring may be mistaken for an incipient hernia; but, the absence of that organ in the scrotum, and the great sensibility of the tumor, are circumstances, by which an attentive practitioner may always avoid the error.

Hæmatocele, or a collection of blood in the tunica vaginalis, is particularly apt to be confounded with a hernia, in consequence of its generally proceeding from a blow, and having the same shape, as the last disease. But, says Mr. A. Cooper, the firmness of the hæmatocele, the redness of the skin accompanying it, its not dilating when the patient coughs, and the spermatic cord being free from swelling at the ring, will point out the difference of the complaint from a hernia.

Cysts, filled with water, sometimes form in the course of the spermatic cord. When quite below the ring, they may be readily discriminated by their not being connected with the abdomen. When they reach within the ring, and have no distinct transparency, nor fluctuation, they should be opened with great circumspection. I have known an encysted hydrocele of the cord accompany the existence of an old hernial sac, be mistaken for a protrusion of the viscera, and, on account of complaints, induced by a kick in the groin, operated upon, under the idea of the case being a strangulated hernia. When the cyst, the supposed hernial sac, was opened, the fluid, which it contained, was discharged, and, on introducing the finger, nothing was found but a circumscribed cavity. After a few more incisions, an opening was made into the real hernial sac, which was not suspected of being so, as no viscera were protruded. Upon passing the finger upward, some fluid now escaped from the abdomen, and all seemed uncertainty, as to what the case actually was; nor did the doubts subside, till the parts were examined after death, the following day.

OPERATION FOR THE BUBONOCELE.

It is first necessary to shave all the hair off the tumor and adjacent parts.

The incision is to commence about an inch above the ring; and, unless the tumor be very large, it is best to extend the wound nearly to the most depending part of the swelling. This cut, through the skin and cellular substance covering the sac, also divides the external pudendal artery, which crosses the hernial sac near the abdominal ring, and sometimes bleeds so freely, that it ought at once to be tied. The same incision, as Mr. Astley Cooper accurately describes, exposes the fascia, which passes off from the external oblique muscle, and covers the sac. Mr. Lawrence has judiciously noticed, that, by beginning the incision above the ring, we gain room where it is much needed, in a subsequent part of the operation, viz. the incision of the stricture.

With a pair of dissecting forceps, a portion of the fascia must next be raised, and a small opening made in it, sufficient for the introduction of a director, on which instrument the surgeon is to divide the fascia, upward to within an inch of the abdominal ring, and downward to the end of the first wound.

This division of the fascia exposes the cremaster muscle, which is to be opened precisely in the same manner.

The sac being now completely brought into view, the operator is to take hold of some of the cellular substance, which adheres intimately to the anterior inferior part of the sac, with a pair of dissecting forceps, and thus he is to raise the sac itself. Then the edge of the knife is to be turned horizontally, and, in this way, the surgeon is to make an opening just large enough to admit the blunt end of a probe, or director; upon which Mr. A. Cooper recommends the sac to be further divided upward to within an inch of the abdominal ring, and downward to the bottom of the tumor. The anterior and inferior part of the sac is selected as the place for making the first opening, because the intestine seldom descends so low; and whenever fluid is contained in the sac, it gravitates to this situation. Mr. Astley Cooper's reasons for not extending the division of the sac nearer to the ring, are to avoid making the closure of the wound more difficult, and to lessen the danger of peritoneal inflammation.

The next object is the division of the stricture. Mr. Cooper directs the surgeon first to introduce his finger into the neck of the hernial sac, for the purpose of ascertaining the exact situation of the strangulation, which he will find either at the abdominal ring, or about one inch and a half from this aperture, in a direction upward and outward; or, lastly, in the mouth of the hernial sac.

When the stricture is produced by the abdominal ring, the above gentleman recommends the surgeon to pass his finger into the sac, as far as the stricture, and then to convey a probe pointed bistoury, over the front part of the sac, into the ring, which is next to be divided, in a direction upward, opposite the middle of the neck of the sac, and to an extent just sufficient to allow the protruded parts to be returned into the abdomen, without hurting them in the act of doing so.

The chief advantages of dividing the ring upward, depend first on the fabric of this aperture not being so much weakened as it would be by cutting upward and outward, so as to divide the transverse tendinous fibres, which cross its upper part; and, secondly, on the safety of the method, in regard to the epigastric artery.

However, Mr. A. Cooper has explained, that a frequent situation of the stricture is not at the abdominal ring, but at the place where the sac opens into the abdomen; that is, an inch and a half, or two inches towards the anterior superior spinous process of the ilium from the ring. Here the strangulation is caused by the transversalis muscle and its tendon, which pass over the hernial sac, in a semicircular direction, and by a fascia arising from Poupart's ligament, the semicircular border of which passes under the sac.

In this case, Mr. A. Cooper advises the surgeon to introduce his finger into the sac, through the abdominal ring, as far as the stricture; and then the probe-pointed bistoury, with the flat part of its blade turned towards the finger, is to be insinuated between the front of the sac and the abdominal ring, till it arrives under the stricture, formed by the lower edge of the transversalis and obliquus internus. The edge of the instrument is to be next turned forward, and the stricture cut in the direction upward, by which method the epigastric artery can scarcely be cut, whatever be its situation in regard to the sac. The division should only be of such an extent as will allow the finger to pass through the strangulation. In this instance, Mr. A. Cooper also employs a bistoury, which only has a cutting edge to some distance from the point.

Another advantage, attributed by Mr. A. Cooper to not dividing the sac is, that in case the epigastric artery should ever be accidentally wounded, the blood could never become extravasated in the abdomen.

When the stricture is caused by the neck of the sac itself, the probe-pointed bistoury must be carefully introduced, and a division made directly upward.

The parts may be strangulated both in the upper and lower openings, at the same time, so that an incision in both these situations would be requisite.

Before Mr. A. Cooper published his work on hernia, it was always customary to divide the portion of peritoneum, which forms the neck of the hernial sac, and there is every reason to believe, that this method ought still to be preferred.

Mr. Lawrence has pointed out, that the impossibility of blood becoming extravasated in the abdomen, when the peritoneum is not cut, is not an important reason in favour of Mr. A. Cooper's method, because the epigastric artery will not be wounded, when the stricture is divided in a proper manner. Mr. Lawrence is also convinced, that cutting the stricture, without the neck of the sac, would be found highly difficult, if not impracticable, by the generality of surgeons, so firmly are the sac and surrounding parts connected together. The same gentleman also sets down the practice as not advisable, even if it were as easy as the common mode of operating. Mr. A. Cooper leaves an inch of the sac below the ring undivided. Thus a bag remains ready to receive any future protrusion, and the chance of a radical cure is diminished.*

Having removed the stricture, the next object is to return the protruded parts into the cavity of the abdomen. Nothing, but an absolute gangrenous state of the intestine, should deter the practitioner from reducing it; the dark chocolate brown discolourations, with which the protruded part is often affected, generally produce no permanent mischief, and ought to be discriminated from the black purple or lead-coloured spots, which are the ordinary forerunners of mortification. The intestine is to be reduced before the omentum. The portion nearest the ring should be introduced first, and held there by the surgeon's finger until followed by another portion.

It is a point of great importance to examine with the finger after the operation, that the reduced parts are fairly and freely in the abdomen. Recent adhesions of the intestines to the inside of the sac may commonly be easily broken by the fingers. When the adhesions are old the cautious employment of the knife is necessary; if they are sufficiently long to allow the intestine to be raised a little from the sac, they may be easily divided. When they are so short, that the inside of the sac and peritoneal coat of the intestines are in close contact, more skill is requisite, and the adherent parts of the sac must be cut off and returned into the abdomen, still adhering to the bowels.

As soon as the intestine has been reduced, the omentum, if not diseased, is next to be replaced. However, when much indurated or thickened, a portion of the latter part may be cut off. If any small arteries bleed, they are to be tied with a fine ligature. The practice of tying the whole omentum ought to be reprobated in the strongest terms. Mr. A. Cooper judiciously remarks, it is extraordinary, that this custom should ever have prevailed. The very object of the operation is to remove from the omentum the stricture, derived from the pressure of a surrounding tendon, and no sooner is this done, than the surgeon applies a ligature, which produces a more perfect constriction, than that, which existed before the operation was undertaken.

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* Lawrence on Ruptures, p. 218—221, edit. 2.

When a portion of the omentum is mortified, the dead part is to be cut off, and the rest returned. This membrane is even said to be sometimes found in a scirrhous state, and to require removal on this account.

In cases of large, old, adherent herniæ, it is best to remove the stricture, without laying open the hernial sac, or, at most, only the neck of it. The separation of the preternatural connexions is often extremely tedious and difficult. Mr. Lawrence has also explained, that the violence, which must necessarily be inflicted, in executing this part of the operation, would be very apt to make the parts inflame. The extensive surface, which must be exposed by laying open the whole of a large hernial tumor; the occasional impossibility of keeping the returned part in the abdomen; the great dilatation of the ring, and the little hope of a radical cure; present numerous reasons in favour of the plan of only dividing the stricture. An incision, two or three inches long, is to be made in the integuments over the abdominal ring. The fascia, covering the sac, is to be exposed, and opened. A director may now be passed under the tendon, and a probe-pointed bistoury conducted along the groove to the part, which is to be cut. In case of difficulty, the neck of the sac may be opened, and then the director introduced, &c.*

MORTIFICATION OF THE INTESTINE.

The swelling, which was before tense and elastic, now becomes soft, doughy, emphysematous, and of a purple colour. Sometimes, the parts now return spontaneously into the abdomen, and the patient survives only a few hours. In other cases, as Mr. Astley Cooper observes, the skin over the tumor sloughs, the intestine gives way, and the feces being discharged at the wound, the symptoms of strangulation soon cease. In this circumstance, the intestine becomes adherent to the hernial sac, the sloughs are thrown off, and thus an artificial anus is established, through which the feces are generally discharged during the remainder of life. Though such is the common course of these unfortunate cases, it sometimes happens, that the feces resume their former track to the rectum, and the artificial anus becomes unnecessary, and closes. I have seen three or four cases of this kind in St. Bartholomew's Hospital.

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* See A. Cooper on Inguinal and Congenital Hernia, p. 45, 46; and Lawrence on Ruptures, p. 236, 237, edit. 2.

The above eminent surgeon informs us, that the degree of danger, which attends an artificial anus, depends upon the vicinity of the sphacelated intestine to the stomach; for, if the opening be in the jejunum, so little space is left for the absorption of the chyle, that the patient dies from inanition.

TREATMENT OF MORTIFICATION OF THE INTESTINE.

If only a small slough has taken place, the intestine is to be reduced without any particular proceeding. I much question the practicability and usefulness of reducing the bowel in such a manner, that the side, on which the slough has formed, will face the mouth of the hernial sac.

In this kind of case, some writers have advised using a ligature, in order to confine the mortified part of the bowel near the wound. However, Mr. Lawrence has very accurately explained, that this proceeding is quite unnecessary, as the disordered part of the intestine never leaves the neighbourhood of the abdominal ring, being kept in this situation by the adhesions of the adjacent parts to each other, in consequence of the inflammation. This statement is confirmed by the opinions of De la Faye,* and Desault.†

Even were the mortified part of the bowel not exactly opposite the ring, there would be no reason to fear any effusion of the contents. It appears from the valuable observations of M. Petit,‡ that the contents of the bowels, and even blood, when extravasated in the abdomen, do not become widely diffused; but, are first kept from spreading about by the pressure of the respiratory muscles, and afterwards by the inflammatory agglutination of the surrounding parts.

When the whole cylinder of the intestine is mortified, all the various proposals, mentioned in the preceding chapter on the treatment of divided intestines, have been recommended. One practice has been that of cutting away the sphacelated part of the bowel, and bringing the two ends together, and keeping them so, by means of four stitches, made with fine thread or silk, and a common sewing needle. Then a thread is to be introduced through the mesentery, for the purpose of keeping the ends of the intestine opposite the mouth of the hernial sac.

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* Cours d'Opérations de Dionis, edit. 5, p. 350, note a.

† Parisian Surgical Journal, vol. 2, p. 366.

‡ Vid. two essays, Sur les Epanchemens, in Mém. de l'Acad. Royale de Chirurgie, tom. 2, and 4, edit. 12mo.

Mr. Lawrence most properly objects to this kind of practice; because, by drawing the intestine out of the cavity, in order to remove the dead part, the adhesion behind the ring, on which the prospect of a cure entirely depends, must be entirely destroyed; and new irritation and inflammation must be unavoidably produced by handling and sewing an inflamed part. Were there no adhesions, however, (which must be a rare case) Mr. Lawrence approves of Peyronie's plan of removing the dead part, passing a ligature through the mesentery, so as to draw this part into a fold, and consequently bring near each other the two ends of the bowel. These are next kept near the ring, by means of the ligature.

In all other instances, Mr. Lawrence recommends dilating the stricture, and leaving the rest to nature. In favour of little interference was also the justly celebrated J. L. Petit.* The sloughs will be cast off; the ends of the gut are fixed near each other by the adhesive inflammation; the wound often gradually closes up; and the continuity of the intestinal canal is re-established.

In other instances, however, the patient survives with the loathsome affliction of an artificial anus.

With regard to dividing the stricture, after the intestine has completely mortified, this measure is, in all probability, generally wrong, because it can now answer no rational purpose, and, besides giving unnecessary pain, must tend to disturb the completion of those salutary adhesions, by which the living part of the bowel is fixed to the wound. On this subject, I perfectly coincide with Mr. Travers. When the bowel is mortified, there is, in fact, no longer any stricture, the resistance which rendered it so, having been taken off by the collapse of the included gut.† The incarceration has actually done its worst, and the parts, acted upon by it, being dead, are clearly susceptible of no further harm. Nor can the incision of the stricture now be necessary, on the ground, that it will promote the evacuation of the intestinal contents, since, when the bowel has given way, before the operation, the sac, and integuments are always loaded with fecal matter.‡ However, the propriety of dividing the stricture, when the gangrenous mischief is but little advanced, is self evident. When the intestine has mortified, but not burst, it is an important object always to make a free opening into it, so that the confined feces may have a ready outlet. The neglect of this practice, no doubt, has often deprived patients of all chance of recovery; for, while the contents of the bowels remain confined, no amendment in the symptoms can be expected. This method was advantageously practised by Gooch, J. L. Petit, and Mr. A. Cooper;* authorities of the highest description.

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* See Traité des Malad. Chirurg. tom. 2, p. 403, 404.

† Travers on Injuries of the Intestines, &c. p. 300, 301.

‡ Op. et loc. citato.

Should a hernia be in a state of gangrene, the propriety also of facilitating the escape of the intestinal contents, by a free incision in the skin and sac, cannot be doubted.†

In cases of mortified hernia, mild purgatives, and clysters; nourishing broths, soups, jellies, &c. wine, bark, and cordials, may all be of infinite service. Poultices and fomentations are the best applications, till the sloughs have come away.

FEMORAL OR CRURAL HERNIA.

The bubonocele and femoral hernia were generally confounded together until Verheyen, about the year 1710, demonstrated their difference.

In males, the crural rupture is very uncommon; but, in females, it is much more frequently met with, than the inguinal hernia. The tumor always takes place below Poupart's ligament, just on the inside of the femoral vein, and, being situated in front of the pectineus, is of course on the outside of the fascia lata. The variety, however, in which the hernia descends into the sheath of the crural vessels, is an exception to the latter statement. The direction, in which it protrudes, is first downwards and then outwards, so that, in attempting the taxis, the surgeon should endeavour to reduce the viscera upwards and inwards towards the navel. The abdominal muscles, Poupart's ligament, and the fascia of the thigh, ought to be relaxed in the same way, as when an attempt is made to reduce a bubonocele.

The general treatment of this case resembles that of other ruptures.

OPERATION.

The incision through the integuments should always commence from the point where the hernia protrudes; that is, let it begin just above Poupart's ligament, a little nearer to the symphysis pubis, than the femoral vessels are, and be continued the whole length of the tumor. Any glands, which may lie over the hernia, should be avoided. The sac is still concealed beneath cellular substance, which is here much thicker, than where the bubonocele occurs, and beneath aponeurotic fibres, which proceed from the femoral fascia, ascend obliquely over the front of the thigh, and are connected with the lower and external part of the tendon of the external oblique muscle. These fibres must be divided before the hernial sac can be exposed. It is to be understood, however, that the femoral hernia is on the outside of the fascia lata, except in a few instances, in which the parts enter the sheath of the femoral vessels. Hence, the operator should make his incisions very cautiously; as the sac, which is usually very thin, lies immediately under the integuments, with the intervention of only a few ligamentous fibres. These may be most safely divided, when a director, or probe, is placed under them.

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* Traité des Mal. Chir. p. 299; Gooch's Chirurg. Works, vol. 2, p. 197; Hey's Practical Observations in Surgery, appendix to edit. 2.

† See Pott's Work, vol. 3, case 21; and Travers on Injuries of the Intestines, &c. p. 208, &c.

The hernial sac is to be opened by means of a pair of dissecting forceps and bistoury. The operator is to raise the part by taking hold of the cellular membrane attached to it, and is then to make a very small aperture by a superficial horizontal cut. Through this opening, a director may be introduced, and the surgeon may then safely divide the sac nearly as high as Poupart's ligament, and quite to the bottom of the tumor.

The next object is to divide the stricture. Until very lately, practitioners have been in the habit of supposing the stricture, in these cases, to be always caused by the front edge of the lower border of the external oblique muscle, in other words, by Poupart's ligament, and, consequently, its division has generally been deemed the chief point of the operation. Le Dran had long ago observed, in operating for a crural hernia, that the closest strangulation was not made by this ligament;* and when he divided the neck of the sac, no doubt he cut what Mr. Hey has since named the *femoral ligament*, the part generally producing the pressure on the strangulated viscera. Gimbernat is entitled to the honour of having first explained, what part it is, that really forms the strangulation.†

Mr. Lawrence remarks, that the lower border of the aponeurosis of the external oblique muscle has a broad insertion into the pubes; this attachment, which begins at the angle, runs along the crista of the bone. Its position, therefore, in the erect state of the body, is nearly, though not entirely horizontal; consequently, its two margins should be described by the epithets anterior and posterior; it being remembered, at the same time, that the former of these is rather higher, than the latter. That part of it, continues Mr. Lawrence, which is fixed to the angle of the bone, has the appearance of a firm, and somewhat round tendinous chord. Its insertion into the crista of the pubes is effected by means of a thinner portion, which gives to the tendon a clearly defined sharp edge at its posterior margin, and is more deeply situated, than the former part, attached to the angle of the bone.*

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* Observ. 57.

† See an Account of a new Method of operating for Femoral Hernia, by Antonio de Gimbernat.

It is this thinner, deep-seated, sharp-edged, posterior margin of Poupart's ligament, near the pubes, that occasions the strangulation in cases of femoral hernia, and requires being divided in the operation. Hey terms it the *femoral* ligament.

Gimbernat has called the space beneath Poupart's ligament the *crural arch*. The anterior crural nerve always passes on the outside of the sheath for the femoral vessels towards its external and posterior part. Before the external iliac artery enters, it sends off the epigastric. This vessel passes obliquely inward, between the crural arch and spermatic vessels. On the inside of the cavity of the sheath, and immediately on the inside of the great iliac vein, there is a foramen, sufficiently distinct, almost round, at which many lymphatics enter. It is sometimes stopped up by a lymphatic gland; but, the parts, which form the crural hernia, always pass through it, and, consequently, Gimbernat calls it the *crural ring*.

Having laid open the hernial sac, in the manner above recommended, a director should next be introduced within the crural ring, on that side of the intestine, or omentum, which is nearest to the symphysis of the pubes, and an incision should be made directly upward (according to Mr. Hey) for the purpose of cutting that part of the ring, which this gentleman names the *femoral ligament*. Gimbernat recommends introducing a director into the ring, with its back towards the intestine, and its groove towards the symphysis pubis. Along the groove a narrow, probe-pointed bistoury is to be introduced into the ring, to divide the internal edge of the femoral ligament closely to the pubes.

UMBILICAL HERNIA, OR EXOMPHALOS.

The viscera protrude, either through the navel, or through an opening in its vicinity, produced by a separation of the fibres of the linea alba.

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* See Lawrence on Ruptures, p. 332, 333, edit. 2.

The umbilical hernia is more common in children, than adults, doubtless, because the navel becomes less capable of dilatation, in proportion to the length of time after birth.

Women, who are pregnant, or who have borne many children, and all subjects, who are exceedingly fat, or afflicted with dropsy, are particularly liable to the umbilical hernia. Owing to the gradual manner, in which the disease usually originates, and to the largeness of the opening, through which the viscera protrude, the exomphalos is less frequently, than other herniæ, attended with incarceration. Hence, it is of the highest importance to be aware, that though patients, having this kind of rupture, are very often affected with symptoms of disorder of the stomach and bowels, the indisposition, in most instances, does not proceed from the existence of strangulation, and often yields to the administration of mild cathartic medicines.

The occasional attacks of colic and sickness, with which patients, labouring under umbilical hernia, are apt to be afflicted, cannot be matter of surprise, when it is recollected, how very large the tumor frequently is, how many of the viscera are often protruded, and how much their functions must be liable to interruption, in conſequence of the manner, in which they are dragged and displaced.

The quantity of the abdominal viscera, that has been found in several umbilical herniæ, and the magnitude, which such swellings sometimes acquire, are really curious, and almost incredible. Pelletan records one case, in which the patient was obliged to support the hernia, by a towel, that was placed under the tumor, and fastened behind her neck; and, when she sat down, she used to rest the swelling on a stool placed between her legs. After death, this hernia was found to contain the omentum; the arch and sigmoid flexure of the colon nearly to the rectum; the whole of the small intestines, except the middle of the duodenum; and one third of the stomach, which had been dragged out with the portion of the duodenum continuous with the pylorus.*

The exomphalos, which is a particularly common disease in women, is generally rendered larger by every pregnancy. As the contents usually consist both of intestine and omentum, the swelling also mostly increases in size as the individual becomes fatter.

When the exomphalos is not kept reduced by a bandage, or truss, but, is continually allowed to protrude, its contents often acquire intimate adhesions to each other and the hernial sac, so as to form altogether one inseparable mass. The intestinal mat-

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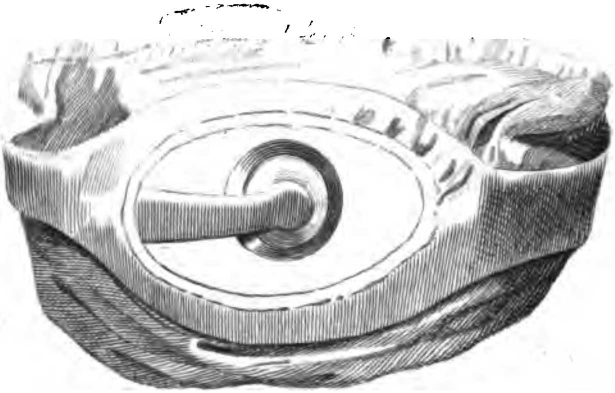
† Clinique Chirurgicale, tom. 3, p. 11.

A Truss for the Exomphalos; invented by Wm. Marrison, of Leeds, Truss maker, and described by Mr. Hey.



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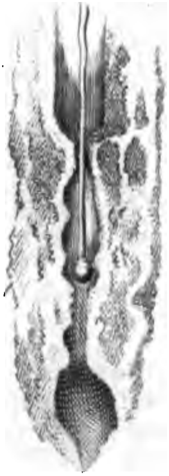

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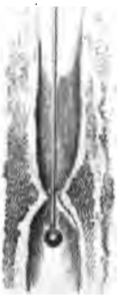

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Mr. C. Bell's balls for examining Stricture.

Published April 1 1807 by R. Phillips, Bridge Street, Blackfriars London.

H. Cooper sculp.

ter then passes, with more or less facility, through that portion of the alimentary canal, which is contained in the tumor. Frequently, it is detained there, in sufficient quantity to cause obstruction, and then, the contents of the intestines accumulate in that part of the bowels, which is betwixt the hernia and the stomach. Vomiting is one of the first symptoms of this kind of rupture. The sort of obstruction, here described, is what the French have called *l'etranglement par engouement*. The matter, brought up from the stomach, often has a fecal smell and colour. The vomiting sometimes takes place without much effort, and may be for a long while almost the only complaint, with which the patient is distressed.

In the mean while, the surgeon endeavours to reduce the hernia by the taxis; and occasionally the obstruction is removed, by means of purgative clysters, doses of the sulphate of magnesia, and the application of ice or cold lotions to the tumor. In other examples, ten days, or a fortnight may elapse, without the symptoms being urgent enough to demand the operation. According to Pelletan, such urgency commences on the swelling becoming painful and inflamed, as the taxis is no longer proper, and further delay would be followed by mortification of the portion of intestine in the hernia.*

When practicable, this rupture should be reduced and supported by a truss, and, in young subjects, a radical cure sometimes follows the continued use of this instrument. The best truss for umbilical hernia is described by Mr. Hey. It consists of two pieces of thin elastic steel, which surround the sides of the abdomen, and nearly meet behind. At their anterior extremity, they form conjointly an oval ring, to one side of which is fastened a steel spring. At the end of this spring is placed the pad, or bolster, which is to press upon the hernia. By the elasticity of the spring, the parts, disposed to protrude, are retained within the abdomen in every position of the body. A piece of calico is fastened to each side of the oval ring, having a continued loop at its edge. Through this loop a piece of tape is to be drawn, and fastened round the patient's body, so as to preserve the instrument in its proper situation.†

Certainly, except in childhood, the only justifiable plan is compression, and no bandage can execute this object so well as the truss described by Mr. Hey.

In very young subjects, however, the exomphalos often admits of being radically cured. With this view, Pott gave a decided preference to bandages; but, perhaps, this method is not nearly so eligible as the employment of a ligature. The great success is surprising, with which the late celebrated French surgeon, Desault, used to tie the neck of the parts, forming the coverings of umbilical herniæ in children, after he had previously reduced the viscera into the abdomen. Desault, after he had put back the contents of the hernia, used to press on the opening with one hand, while with the other he raised the sides of the sac, and felt with his fingers, that no part remained unreduced. His assistant then put a waxed ligature, of moderate size, several times round the basis of the integuments and hernial sac. The ligature was secured, at each turn, with a double knot, drawn with such tightness, as to cause an inconsiderable degree of pain. The tumor was next covered with lint, and compresses, which were supported with a bandage, applied round the body.

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* Op. cit. p. 89.

† Plate VIII. fig. 1.

The next day, the tumor becomes slightly swollen; and, on the second day, the parts shrink, and the ligature grows slack. Hence, another one is to be rather more tightly applied, which gives somewhat more pain, than the first. The swelling now soon becomes livid and flaccid; and a third ligature quite cuts off the circulation. The parts are usually detached about the eighth, or tenth day, a small ulcer remaining, which readily heals. For the sake of security, the cicatrix is afterwards to be supported with a circular bandage, for two, or three months. Till the age of eighteen months, the success of the preceding method is tolerably certain; in children four years old it may succeed; but, at the age of nine, it has failed.*

When, in adult subjects, an operation is unavoidable, on account of a strangulation, and the hernia is large and of long standing, the whole sac should not be opened. An incision, about three inches in length, made through the integuments covering the upper part of the tumor, would be quite sufficient to enable the operator either to open and dilate the mouth of the sac directly upward, or merely to divide the linea alba, immediately above the tumor, in the same direction.

However, cases may occur, in which the strangulation may arise from the pressure produced on the intestine by the thickened omentum in the sac, and in which it would be necessary to expose freely the contents of the tumor, and to remove the diseased omentum. The only instance, in which I have seen an operation performed, was of this kind; and no dilatation of the aperture, through which the parts had protruded, was requisite.

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* Œuvres Chirurgicales de Desault par Bichat, tom. 2. This treatment has been practised with success by Mr. Downing, of Stourbridge, Worcestershire. Vid. London Med. Review, vol. 4, p. 84.

CONGENITAL HERNIA.

In this case, the intestine, or omentum, is situated in contact with the testicle, and, consequently, in the cavity of the tunica vaginalis, which forms, as it were, the hernial sac.

The manner, in which the congenital hernia is formed, was not understood, till about the middle of the last century, when the subject was elucidated by Haller, Hunter, Pott, Camper, Wrisberg, and other distinguished men.

The occurrence of this particular hernia arises from the change of situation, which the testis undergoes in the fœtal state. This part is originally formed and situated in the loins, where it receives a covering from the peritoneum, like the other abdominal viscera, and whence it descends into the scrotum, about the eighth, or ninth, month of pregnancy. As it passes through the abdominal ring into the scrotum, it carries with it a portion of the peritoneum, and the opening, through which the testis passes, becomes closed and obliterated, before the time of birth.

The surgeon should understand, that the covering, which the testis first derives from the peritoneum up in the loins, constitutes the future tunica albuginea, while the portion of the peritoneum, which it afterwards carries along with it, as it passes the abdominal ring, forms the tunica vaginalis.

When, as every now and then happens, the communication between the tunica vaginalis and abdomen remains open after birth, the intrusion of a piece of intestine, or omentum, into the cavity of that membrane, is very apt to occur, and occasion, what is termed, a *congenital* rupture. The generality of surgical writers assert, that the communication, between the tunica vaginalis and the abdomen, is prevented from being closed, by the intrusion of the viscera. However, the fact is, that the congenital hernia, is not named with strict accuracy, since the bowels generally do not protrude till after birth. Before respiration begins, and the action of the abdominal muscles commences, there is no cause capable of pushing the viscera out of the belly. Sometimes, notwithstanding the passage from the abdomen into the tunica vaginalis is not shut up, a hernia does not happen till many years have elapsed.

When the hernia is really congenital, that is, formed at the time of birth, the cause may be referred to an accidental adhesion having taken place, between a piece of intestine, or omentum, and the testis, in its descent.*

In the congenital hernia, the testicle cannot be distinctly felt on the outside of the tumor, at its inferior and posterior part, as it can in other cases.

In this instance, the testicle lies in the same cavity, in which the protruded viscera are situated, and, consequently, can only be felt in a very obscure manner. The tunica vaginalis, also, frequently contains at the same time a fluid, so that a fluctuation is perceptible, and the disease is liable to be mistaken for a hydrocele. Mr. Astley Cooper states, that this complication may be ascertained by returning all the contents of the tumor into the cavity of the abdomen, when the patient is in a horizontal posture, and then, on putting the finger against the abdominal ring, the water will insinuate itself into the scrotum, so as to produce a kind of hydrocele. If the pressure of the finger is now diminished, and the patient is desired to cough, the intestine and omentum will be felt falling down into their former situation.

We may always suspect a scrotal rupture to be of the congenital kind, when it is in a child, or has existed from infancy.

TREATMENT.

The congenital hernia, when returnable, ought, like all other ruptures, to be reduced, and constantly kept up by a proper bandage; and when strangulated, its treatment does not materially differ from that of common herniæ.

When the testicle, however, has not completely descended, a truss should not be worn, as it would prevent this part from arriving in its proper situation.

In young subjects, a radical cure may be effected by keeping the parts constantly reduced, by means of a truss; for the communication between the tunica vaginalis and the cavity of the abdomen, has a natural tendency to become obliterated. However, in adults, the use of a truss is only a palliative plan.

In performing an operation, in order to relieve a strangulated congenital hernia, the tunica vaginalis is to be opened in the same manner as a common hernial sac, and the stricture divided, either directly upward, or upward and outward.

The surgeon should examine with his finger, to ascertain whether the incarceration is produced by the transversalis, or by the orifice of the tunica vaginalis. In the first case, the bistoury need not, in Mr. A. Cooper's opinion, be introduced within the neck of the latter part.

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* Wrisberg, in Comment. reg. soc. scient. Goetting. 1778; and Lawrence on Ruptures, p. 426, 427, edit. 2.

HERNIA OF THE BLADDER.

This case differs from every other species of hernia, in having no hernial sac covering the protruded viscus. The peculiarity is entirely owing to the bladder being actually situated on the outside of the cavity of the peritoneum. It is true, this membrane, where it forms a kind of a partition, between the abdomen and pelvis, covers the fundus and posterior surface of the bladder, as far as the insertion of the ureters; but, when, by the reiterated pressure of the neighbouring parts, this viscus is made to protrude through one of the abdominal rings, its anterior, or rather lateral part, will be the first to make its exit, in consequence of being nearest the aperture.

But, before the protrusion takes place, the above part of the bladder must separate that portion of the peritoneum, which lines the inside of the abdominal ring. The anterior part of the viscus, having once entered the opening, the posterior one must necessarily follow, together with the portion of the peritoneum, attached to it, and to the fundus of this organ. Thus the continuous part of this membrane, lining the abdominal ring, will become in the end dragged, so as to occasion a pouch, following the portion of the bladder, which forms the hernia. In intestinal and omental ruptures, the hernial sac always precedes the viscera; but, in the case of cystocele, the bladder is first protruded, and the peritoneum follows it.

The peritoneal pouch, following the displaced bladder, being empty, and its cavity communicating with the abdomen, it is easy to conceive, how a hernia of this organ should sometimes be complicated with one of the omentum, or intestines.

In most instances, the spermatic cord lies behind the hernia; but, Le Dran and others have met with it situated in front of the tumor, and Mr. Keate relates a case, in which it was on the external side of the swelling.*

The diagnosis of the cystocele must be rendered sufficiently manifest by the regular subsidence of the tumor whenever the patient makes water, and by his being obliged to compress the swelling, in order to accomplish this evacuation with ease.

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* Cases of Hydrocele, &c., to which is subjoined a singular case of hernia vesicæ urinariæ, Lond. 1778.

In many examples, the protruded bladder has contained urinary calculi.*

TREATMENT.

While recent, this hernia is easily reducible, and may be kept up by a bandage, or truss; but, when of long standing, or large size, the outer surface of the bladder has become adherent to the surrounding parts, and the patient must be contented with a suspensory bag.

The rarer sorts of herniæ cannot be treated of consistently with the plan of the present publication.

CHAP. XLVI.

HYDROCELE.

OF this disease, there are three principal kinds; one, in which the fluid is lodged in the cellular texture of the scrotum; another, in which it is contained in the tunica vaginalis; and a third, in which the fluid collects in the spermatic cord.

The first sort is, strictly, only an anasarcous swelling of the scrotum, and a symptom of a dropsical affection of the whole system. The two other kinds are absolutely local, generally attack one side only, and are frequently found in persons, who are perfectly free from all other complaints.

The case, in which the water is contained in the cellular texture of the scrotum, if a symptom of dropsy, belongs to the province of the physician, and if ever a local affection, it requires nothing more to be said concerning it, than what is contained in the chapter on Œdema.

HYDROCELE OF THE TUNICA VAGINALIS.

SYMPTOMS.

The symptoms of this complaint are, a colourless, smooth, roundish, pyriform, sometimes oblong swelling, which slowly and gradually extends upward from the lower part of the scrotum. The tumor does not disappear on pressure. At first, it is soft and fluctuating; and, on the fingers being removed, it immediately rises to its former level. The swelling cannot be diminished, nor pushed into the cavity of the abdomen, by any artifice of the surgeon. When the disease is more advanced, and has attained a larger size, the tumor becomes oblong, heavy, and hard, though much less so, than in the case of an enlarged testicle. At the same time, the fluctuation grows less distinct. If the fluid contained in the tunica vaginalis be clear, this membrane not much thickened, and a candle be placed behind the tumor, the scrotum has a semi-transparent appearance. At last, the hydrocele so conceals the testicle, that this body can only be distinguished, at the upper and back part of the tumor, by a certain hard feel. The spermatic cord, however, is still quite obvious to the touch. Though the swelling may have acquired its greatest size, and the scrotum be considerably distended, the corrugations of the latter part are seldom so completely obliterated as they are in the anasarcous hydrocele. The penis seems small, and, as it were, sunk in the tumor. The integuments of the scrotum also acquire an increased thickness; the veins appear large, and there is rather a sense of elasticity, than of fluctuation, communicated to the surgeon's fingers. Even the spermatic cord itself becomes somewhat concealed, when the hydrocele has ascended very far.

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* Pott's Chirurgical Works, vol. 3, p. 323; Récherches sur la hernie de la vessie par Verdier, in Mém. de l'Acad. de Chir. tom. 2, 4to, &c.

In these cases, the tunica vaginalis always becomes more and more thickened, which change is common to all membranes, when they are long distended.

CAUSES OF THE HYDROCELE OF THE TUNICA VAGINALIS.

This subject is still very obscure, and little certain is known concerning it. In general, the disease appears to originate spontaneously; but, sometimes it seems to proceed from a contusion, or a considerable friction of the scrotum in hard-riding. From the observations of Mr. Ramsden, it would appear, that the origin of this complaint may occasionally be owing to an irritable state of the urethra.* Exposure to cold, and the pressure of ill-constructed trusses on the spermatic cord, are also alledged to be sometimes the cause of the disease. Hitherto, I am afraid, it cannot be truly said, that our conjectures, respecting the causes of the hydrocele, have afforded any material light in the investigation of the treatment. Fortunately, this imperfection in our knowledge is of less importance, as the practical surgeon is only anxious to find out a safe and certain method of cure, and this is now fully discovered. Let me only observe further, that this hydrocele frequently affects the most healthy and robust persons; that it has no connexion with a general dropsical habit, nor debility; and that it is almost always entirely a local affection, which may be cured with safety.

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* See Practical Obs. on the Sclerocele, &c., by Thomas Ramsden, surgeon to Christ's Hospital, &c. &c. p. 198—201.

TREATMENT.

The hydrocele of the tunica vaginalis is relieved either in a palliative, or radical manner.

PALLIATIVE CURE.

This consists in merely puncturing the tumor with a lancet, or trocar, for the purpose of evacuating the fluid. The latter instrument, when small, is always to be preferred, as the cannula facilitates the escape of the water, and prevents its diffusing itself in the cellular texture of the scrotum. When the hydrocele is of an immense size, the palliative treatment ought first to be practised, and the radical cure should not be undertaken, till the tumor has acquired about two-thirds of its former magnitude. When the radical cure of a very large and extremely tense hydrocele is at once practised, the succeeding pain and inflammatory symptoms often run to an unnecessary height.

From the above account of the disease, it must be clear, that the proper place for introducing the trocar is at the anterior and lower part of the tumor, this spot being commonly the most remote from the testicle.

But, although this is ordinarily the best place for the puncture, it is not invariably so, because the direction, in which the tunica vaginalis becomes distended, is liable to be influenced by particular circumstances. The tumor is, in general, of an oval shape, the greatest diameter extending downwards. Yet, occasionally the position of the swelling is oblique, or even completely transverse. In this last circumstance, it may actually be necessary to introduce the trocar on the right side of the scrotum, notwithstanding the collection of fluid may be situated in the cavity of the left tunica vaginalis. Probably, such deviations of a hydrocele from its common shape may sometimes be caused by the pressure of suspensory bandages, tight breeches, &c.*

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* Richter's Anfangsgr. der Wundarzn. band. 6, p. 59, edit. 2.

In the hydroceles of children, the testicle occupies a lower situation, than it does in those of grown up persons. This is owing to the swelling extending with more facility towards the abdomen in young subjects, by reason of the tunica vaginalis ascending further along the spermatic cord. Hence, in order to avoid injuring the testicle, in tapping the hydrocele of a child, the surgeon should introduce the trocar somewhat higher up, than the place usually chosen in adults, and direct the instrument rather less obliquely backward.*

A small piece of soap-plaster should be put on the puncture, and a bag truss worn after the operation.

RADICAL CURE.

This is accomplished by evacuating the fluid, and exciting such a degree of inflammation in the tunica vaginalis and testicle, as shall lead to an universal adhesion of this membrane to the tunica albuginea, and, consequently, occasion a complete obliteration of that cavity, in which the water was collected.

The object may be achieved by a seton, by caustic, by an incision, or by distending the cavity of the tunica vaginalis with a proper kind of injection.

SETON.

Mr. Pott used to give the preference to this method. The tumor is to be pierced, and the fluid discharged by means of a trocar in the common way. A seton-cannula is then to be passed through that of the trocar, until it reaches the upper part of the tunica vaginalis. This done, a sharp-pointed eye probe, armed with a seton, is to be conveyed through the latter cannula; the tunica vaginalis and integuments are to be pierced by its point, and the seton to be drawn through the cannula, until a sufficient quantity is brought out of the upper orifice. The two cannulæ are then to be withdrawn.

The patient is to be put to bed, and may take twenty or twenty-five drops of the tinct. opii.

CAUSTIC.

The *kali purum cum calce vivâ* is usually employed; with it an eschar is made along the whole front of the tumor, about half an inch broad. This method may now be considered as entirely exploded; when the eschar separates, the opening seldom extends into the tunica vaginalis, and an instrument must after all be employed to discharge the fluid. The destruction of a part of the scrotum is quite unnecessary; and, the operation is both more painful and less certain in its effect, than any of the others above mentioned.

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* Vid. Richerand's Nosographie Chir. tom. 4, p. 243, edit. 2.

INCISION.

The anterior and inferior part of the tumor is to have a puncture made in it, of sufficient size to enable the operator to introduce the end of his fore finger into the cavity of the tunica vaginalis. This he should do immediately, and before the fluid is all discharged, and the tunica vaginalis collapsed. Then, with a blunt-pointed curved bistoury, the tunica vaginalis may be safely divided throughout its whole length.

When the tunica vaginalis is very much diseased, this method has the advantage of allowing the operator to remove any part of the thickened indurated membrane. However, according to Sir James Earle, the method, which we shall next describe, seems to be followed by success, even when the tunica vaginalis is considerably thicker, than natural. After the operation, the wound is be to covered with a small quantity of fine lint, over which a pledget is to be placed. This plan of cure is certainly superior to that by caustic; but, it is not so good as the employment of a seton, in the way recommended by Mr. Pott.

INJECTION.

The hydrocele is to be tapped with a trocar at its anterior and inferior part, and as soon as the fluid is entirely discharged, the cavity of the tunica vaginalis is to be distended to its former dimensions, with an injection, composed of two parts of red wine, and one of warm water. The injection is to be allowed to remain in the part about five minutes, after which it is to be discharged through the trocar.

The public are indebted to Sir James Earle for his having brought the mode of curing hydroceles by an injection, into a state of great perfection. The fluid is recommended by this gentleman to be injected into the tunica vaginalis, through a pipe, one end of which is made to fit the cannula of a trocar, the other adapted to receive the neck of an elastic bottle, with a valve or ball in the centre of the pipe, to permit the entrance, and prevent the exit of the injection. Sir James has found the latter contrivance infinitely more convenient, than a stop cock, which requires a hand to turn it. When the tunica vaginalis is sufficiently distended, the body of the syringe may be removed.

The cure by injection is that, which is now generally preferred by the best English surgeons.

The treatment of the local inflammation, after any of the above operations, is similar to that of the hernia humoralis, on which subject, we shall very soon offer a chapter.

Sometimes the tunica vaginalis contains a good deal of fluid, in consequence of there being a preternatural communication between it and the peritoneum. This case is termed the *congenital hydrocele*. In young subjects, while the disposition of the opening to contract exists, it is probable, that this disorder might be cured by the uninterrupted use of a truss, a moderate length of time. Desault succeeded in curing the complaint with a red wine injection. If any viscera were protruded from the abdomen, he used to reduce them, and then tap the hydrocele in the common manner. At the same time, an assistant was employed in making pressure, so as to close the communication between the tunica vaginalis and abdomen. Then the injection was introduced, and allowed to remain a short time, after which, it was let out, and a truss applied to keep any of the viscera from descending. The French state, that this operation is successful, and does not produce any inflammation in the abdomen.*

HYDROCELE OF THE SPERMATIC CORD.

In some instances, this is an œdematous affection of the whole of the cellular substance of the spermatic cord; in others, the fluid is confined to one, or more cavities, within the sheath of the spermatic vessels. The first case is termed simply *hydrocele of the spermatic cord*; the second, *encysted hydrocele* of this part.

The first complaint is not a very common one, does not cause much inconvenience, unless when very large, is usually mistaken for a varix of the spermatic cord, or an adherent omental hernia, and seldom leads the patient to do any thing else, than wear a suspensory bandage.

When the disease is of a moderate size, the scrotum appears quite healthy, except that, when not corrugated, it seems rather fuller, and hangs rather lower on that side, than on the other. The testicle can be distinctly felt, below this fulness, quite unenlarged. The spermatic cord feels considerably enlarged, as if its vessels were varicose, or there existed an irreducible epiplocele. The tumor is broader at the bottom, than at the top. It seems to diminish when compressed; but, immediately resumes its former size, when this pressure is discontinued, and as easily in a supine as in an erect posture. There is a very trivial uneasiness; not in the swelling itself; but, in the loins.

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* See Œuvres Chirurg. de Desault par Bichat, tom. 2,

When very large, the complaint creates considerable deformity and inconvenience.

The only mode of radically curing the disease is making an incision into the tumor from the abdominal ring down to the testicle.

Unless the disease were very large and troublesome, the patient should be content with a suspensory bandage.

ENCYSTED HYDROCELE OF THE SPERMATIC CORD.

This most frequently occupies the middle part of the cord, between the testicle and groin, and is generally of an oblong shape. It is so tense, that the fluctuation of the water within it cannot always be easily distinguished. It is perfectly circumscribed, and occasions no pain. The testis and epididymis can be distinctly felt below the tumor, quite independent of it. The upper part of the cord in the groin is usually very distinguishable. As Mr. Pott observes, it undergoes no alteration from change of posture, nor is it affected by coughing. The functions of the alimentary canal are not disturbed by it.

Infants are much more subject to this disease, than adults. In the former, the fluid may often be dispersed by aperient medicines and fomentations. If it should not yield to this treatment, a small puncture, sufficient to evacuate the fluid, commonly produces a cure. In adults, it is sometimes requisite to make an incision through the whole length of the tumor. Perhaps, it might be better to have recourse to the red wine injection, after discharging the fluid by means of a very small trocar.

CHAP. XLVII.

HÆMATOCELE.

THIS signifies a swelling of the scrotum, or spermatic cord, occasioned by blood.

The disease is of five kinds, two of which have their seat in the tunica vaginalis; one within the albuginea; the fourth in the membrane investing the spermatic vessels; and the fifth in the cellular substance of the scrotum.

1. In letting out the water of a hydrocele, a vessel is sometimes wounded. After the operation, the blood insinuates itself partly into the tunica vaginalis, and partly into the cellular substance of the scrotum, so as to form, in a very short time, a tumor nearly equal in size to the original hydrocele. The blood colours the fluid of the hydrocele, when it is flowing through the cannula.

2. Another species is when the blood is effused in consequence of a spontaneous rupture of a vessel after the operation, and it is entirely confined to the cavity of the tunica vaginalis. The fluid of the hydrocele is not tinged with blood, when it is discharged.

3. In the third kind of hæmatocele, the blood is extravasated within the tunica albuginea, from the vessels of the glandular part of the testicle.

4. The fourth arises from a rupture of a branch of the spermatic vein.

5. The fifth case is of the same nature as ordinary effusions of blood in the cellular substance of other parts of the body. Like them, it is caused by blows, and it yields to similar treatment.* The scrotum has been rendered five times larger, than its natural size, by this species of hæmatocele.† Richerand, (as I conceive, on insufficient grounds) rejects all the other species of hæmatocele, but the last.

TREATMENT.

The two first cases may generally be cured by opening the cavity of the tunica vaginalis, removing the effused blood, and applying dry lint to the inside of the membrane. If the quantity of blood were very small, discutients might disperse it, and do away all necessity for operating.

The third and fourth cases are less frequent.

The first of these arises from a morbid state of the substance of the testicle, and can only be cured by castration.

The fourth species of hæmatocele, or that arising from a rupture of the spermatic vein, is generally caused by great or sudden exertions, contusions, &c.

When the case is clearly distinguished from a hernia, attempts must be made to promote the absorption of the extravasated

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[*] See the Chapter on Contusions.

[†] Richerand's Nosographie Chirurgicale, tom. 4, p. 239, edit. 2.

blood, by applying to the tumor the sal ammoniac lotion, or even camphorated liniments. About twice a week, a purgative should also be exhibited.

If the case should obstinately resist such treatment, a thing which can hardly occur, an incision must be made into the tumor, and the bleeding point being discovered, it should either be tied, or stopped with a dossil of lint.

In the fifth case, or that of blood effused in the cellular membrane of the scrotum, a free incision is the best practice, when the swelling is excessive, or resists discutient means; but, in other instances, it will be sufficient to keep up the scrotum with a suspensory, apply camphorated spirit, or the lotio ammoniæ muriatæ; and exhibit two or three purgative draughts.

Should inflammation of the parts arise, venesection, leeches, and febrifuge medicines, would be proper, and the best application would then be the saturnine lotion, or (if suppuration were unavoidable) an emollient poultice.

CHAP. XLVIII.

DISEASES OF THE TESTICLE; SARCOCELE, &c.

THIS is the term applied to every chronic, fleshy, enlargement of the testicle. Hence, not only several kinds of sarcoma affecting this body, and noticed in the chapter on that subject, acquire this name, but also some diseases of the testicle generally considered to be scrofulous. Even scirrhus and cancer, when situated in this part, have been improperly blended with numerous other morbid affections, and comprehended under one common title, *sarcocele*.

It seems quite unnecessary to insert here an account of sarcomatous diseases of the testicle; for, they have no peculiarity in them, except what arises from their situation. The testicle is particularly liable to the *common vascular*, *cystic*, and *medullary sarcoma*, and each of these species has been described in the chapter on sarcomatous tumors.

The testicle is sometimes converted into a truly scrofulous mass. It is enlarged in size; and when cut into, a whitish or yellowish coagulated matter is discovered, mixed with pus.

This complaint is not attended with so much pain and induration, as a scirrhous disorder of the testicle, nor does it produce any unfavourable state of the health.

As Dr. Baillie observes, the testicle is often found converted into a hard mass, of a brownish colour, and generally intersected by membranes. Sometimes there are cells in the tumor, filled with a sanious fluid.* This is the truly scirrhous testicle, which is attended with great hardness, severe pains darting along the spermatic cord to the loins, and an unequal, knotty feel. The health commonly becomes impaired. To use Mr. Pott's words, sometimes the fury of the disease brooks no restraint; but, making its way through all the membranes, which envelop the testicle, it either produces a large, foul, stinking, phagedenic ulcer with hard edges, or it thrusts forth a painful gleeting fungus, subject to frequent hemorrhage.† These latter states of the disease are denominated the *cancer of the testis.*

Sooner or later, the scirrhous induration extends from the epididymis upward along the spermatic cord, even within the abdominal ring. In the latter circumstance, the lymphatic glands in the loins usually become diseased; and this extension of mischief, together with the impossibility of removing the whole of the diseased cord, too frequently deprives the patient of every chance of getting well.

It is now well known, that the most simple sarcomatous enlargements of the testicle are capable of assuming, in a very sudden manner, a malignant and cancerous tendency; and that sometimes the scirrhous induration of the cord makes a rapid progress upward. Hence, that surgeon acts with prudence, who recommends an early extirpation of every testis, that is incurably diseased, and so deprived of its original organization, as to be totally unfit for the secretion of the semen.

Chronic enlargements of the testicle are sometimes attended with an accumulation of limpid fluid in the tunica vaginalis, and the disease is then termed *hydro-sarcocele*, an appellation, first employed by Fabricius ab Aquapendente.

From what I have seen of sarcoceles,‡ I am entirely of opinion with Mr. Pott, that the man, who has the misfortune to be thus afflicted, has very little chance of getting rid of the disease by any means but extirpation; and all the time the operation is deferred, he carries about him a part not only useless, but burdensome, and which is every day liable to become worse, and unfit for such an operation.

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* Morbid Anatomy of some of the most important parts of the Human Body, p. 352, 353, edit. 2.

† Pott's Chirurgical Works, vol. 2, p. 390, edit. by Earle, 1808.

‡ By which, I here imply diseases of the testicle, attended with subversion of its natural structure.

As leaving a man with a malignantly diseased testicle, quite unassisted, to meet his lingering fate, is a very serious step; all surgeons ought to be well apprised, that every enlargement of the spermatic cord, in these cases, is not of that particular description, which amounts to a prohibition of an operation.

One enlargement of the cord is perfectly free from malignancy, and proceeds either from a varicose dilatation of the spermatic veins and arteries, or from a collection of fluid in the membrane enveloping the said vessels. In this case, the cord, though enlarged, is smooth, soft, and compressible; the whole process is loose and free, and will easily permit the fingers of an examiner to go all round it, and to distinguish the parts, of which it is composed; and it is not painful when touched.

In that morbid state of the cord, in which the operation is forbidden, the part is unequally hard and knotty; the parts, of which it consists, are undistinguishably blended together: and handling it occasions pains, shooting up to the loins and back.

I should be sorry, if the foregoing observations were to deprive a single individual of the chance of avoiding a severe operation, and preserving an organ, to which in general the highest value is attached. That there are some chronic enlargements of the testicle, which may be resolved, is a truth, of which experience must have convinced the generality of surgeons. The scrofulous induration, and several other swellings of this organ, which are very imperfectly understood, I believe, may sometimes be benefited, and even entirely cured, just like some analogous affections of the breast. Hence, though I am an advocate for the early performance of castration, in cases of sarcocele, where there is reason to suppose the disease so far advanced, that the organization of the testicle is totally destroyed, or where internal and external remedies have been tried a certain time in vain; this sentiment does not incline me to recommend the operation for other examples, in which the disease is quite recent, and no plan of treatment whatsoever has been fairly tried. That disease of the testicle, usually considered as scrofulous, may sometimes be diminished by administering internally cicuta and calomel, and applying to the scrotum lotions, or poultices, made with sea-water. Several other cases yield to a course of mercury; leeches being daily applied to the scrotum, or frictions made on the part with camphorated mercurial ointment. In every case, the diseased organ must be well supported by means of a suspensory bandage. According to the observations of Mr. Ramsden, that species of sarcocele, which he has called sclerocele, admits of relief, by removing with bougies the morbid irritability of the urethra, with which its origin appears to be frequently connected.*

We are not, therefore, to consider every chronic enlargement of the testicle as incurable: my wish has only been to impress the reader with the expediency of not wasting too much time in the trial of means, which are not to be depended upon, and which, if continued immoderately long, might allow the disease to advance too far to be capable of being afterwards effectually extirpated.

FUNGUS OF THE TESTICLE.

There is a particular affection of the testicle, in which a fungus grows from the glandular substance of this body, and, in some cases, from the surface of the tunica albuginea. This excrescence is usually preceded by an enlargement of the testicle, in consequence of gonorrhœa, a bruise, or some species of external violence. A small abscess takes place and bursts, and, from the ulcerated opening, the fungus gradually protrudes.

If, when the inflammatory affection of the testicle has subsided, the substance of this body should not be much indurated or enlarged, it is a very rational practice, to endeavour to extirpate the fungus, and diseased portion of the testis, without removing the whole of this body.

The object may sometimes be fulfilled by destroying the fungus with the lapis infernalis. But, at all events, the fungus, and whatever superficial portion of the substance of the testicle is also diseased, might be removed with a knife. Such an operation was some time ago performed, with success, by Sir James Earle, in St. Bartholomew's Hospital.

Though this seems to be a judicious practice, when the organization of a considerable part of the testicle is not totally subverted by disease, and, particularly, when the fungus grows entirely from the tunica albuginea; yet, if the whole substance of the testicle were so diseased, that the part would still be an useless and troublesome mass, though the fungus were removed, the surgeon ought undoubtedly to perform castration.

An interesting paper on this disease has been published by Mr. Lawrence, and as it conveys an accurate idea of the real nature of the case, I would recommend it to the attention of every practitioner.† Surgeons have certainly often advised castration, in consequence of not understanding the true character of the complaint.

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* See Pract. Obs. on the Sclerocele, &c.

† See Edinburgh Medical and Surgical Journal, vol. 4, p. 257.

HYDROCELES, WITH DISEASED TUNICA VAGINALIS, LIABLE TO BE MISTAKEN FOR SARCOCELES.

It frequently happens, that the tunica vaginalis becomes very much thickened, indurated, and even cartilaginous, at the same time that its cavity is filled with fluid. Schmucker has seen hydroceles, which felt as hard as a sarcocele, and Saviard relates, that they are sometimes attended with the hardness of horn. The feel of the tumor is very apt to deceive the surgeon, and to make him suppose the case to be a hydro-sarcocele, while, in fact, the testis itself is perfectly sound. I have seen several preparations of this disease in anatomical museums, and, in general, the parts had been injudiciously removed by castration.

This is one kind of hydrocele, for which the radical cure by an incision may sometimes be most eligible; because, the surgeon is thereby enabled to cut away the hardened tunica vaginalis, and to ascertain, with his own eyes, the actual state of the testicle.

CHAP. XLIX.

CASTRATION.

THE incision should commence a little above the place where the operator purposes to divide the spermatic cord, and it should be continued nearly to the bottom of the tumor. The generality of surgeons next make a short incision on each side of the place where they intend to divide the cord, in order to detach this part from the adjoining fat, and to be able to put their finger under it. This being done, they introduce a ligature under the cord, and tie it in a very firm manner. At the moment of doing this, the patient is put to excruciating torture; such suffering, indeed, as few can endure without complaint, let their fortitude be ever so great.*

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* Le Dran appears to have entertained a just aversion to this painful and unnecessary plan: " Of the several parts of the cord, (says he,) none but the artery will bleed; why then should the cremaster muscle, the vas deferens, and the nerve be tied with it? We are sensible, that convulsive motions have ensued from this method of making the

A very considerable part of this agony is known to arise from including the vas deferens in the ligature. As this vessel can always be distinctly felt, by reason of its firm structure, at the back part of the cord, as it can always be most easily separated from the rest of this process, and no good whatever can possibly result from tying it, the surgeon, who puts the patient to unnecessary pain, by including the whole spermatic cord in the ligature, is highly reprehensible. At all events, it is his duty to leave out the vas deferens. A common aneurism-needle is the most convenient instrument for introducing the ligature, which is afterwards to be firmly tied.

But, when the spermatic cord is free from disease, and it is unnecessary to divide it near the abdominal ring, there is a method of proceeding still better, than that, which I have already mentioned. Desault, and several other excellent modern surgeons, have shewn, in their practice, that, under such circumstances, the spermatic cord may be safely divided with a knife at once, the hemorrhage being stopped by the surgeon firmly holding the upper end of the divided part between his finger and thumb, until the extremities of the spermatic arteries have been tied in the common way, with the assistance of a pair of forceps.*

However, if the surgeon should prefer tying the cord, let him never neglect to leave the vas deferens out of the ligature: having done this, he is to pass a curved bistoury under the whole cord, and divide it below where it is tied.

The rest of the operation is extremely simple. It merely consists in dividing the loose cellular substance, which connects the testicle with the inside of the scrotum. In performing this easy task, it is proper to incline the edge of the knife towards the tumor, which, after the division of the cord, may be considered as dead, and destitute of sensation.

When the diseased testicle is very much enlarged, it is reckon-

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ligature upon them all." Operations in Surgery, p. 147, transl. by Gataker, edit. 2.

With respect to tying the spermatic arteries, without the nerves, I believe this desirable object is not altogether practicable even in Desault's mode of operating. "Les nerfs (says Bertrandi) sont tellement entrelacés et confondus avec les vaisseaux, et sont d'ailleurs si fins, que le chirurgien ne peut jamais se promettre de les séparer tous; ce qui est très difficile à faire, même sur le cadavre." Although this excellent surgeon acknowledges the ease, with which the vas deferens may be left out of the ligature, he seems unaware, that tying this vessel is painful, and therefore does not condemn it. Opérations de Chirurg. p. 207.

* Œuvres Chir. de Desault par Bichat, tom. 2, p. 451.

ed advantageous to remove a part of the distended scrotum, because a considerable quantity of loose flabby skin makes it difficult to put the edges of incision evenly together, and is apt to serve as a lodgment for matter.* The manner of executing this object consists in including the portion of the scrotum, that is to be taken away, in two elliptical incisions, the length and interspace of which must be regulated by the magnitude of the swelling. Then the spermatic cord having been divided, and the arteries secured, the diseased organ is to be dissected out, the incisions being extended on each side from the elliptical cuts already made.

If any artery in the cavity of the scrotum should bleed profusely, it ought to be tied before the wound is closed.

The edges of the incision are to be brought together with sticking plaster, over which a pledget, compress, and the T bandage, are to be applied.

Sometimes, after the patient is put to bed, a hemorrhage takes place; and, frequently when the wound is opened, no particular bleeding point can be discovered. I have generally observed, that the application of cold water to the scrotum, by means of wet linen, placed over the adhesive plaster, is the best way of checking this kind of hemorrhage. Should this plan be unavailing, the dressings must be taken off, and the bleeding vessel looked for, and tied. It will often be found towards the septum scroti.

The upper part of the spermatic cord occasionally swells so considerably, after the operation, that it becomes strangulated by the abdominal ring, and vast suffering is the consequence. Authors state, that this sort of case may require a division of the aperture, that produces the constriction.† I cannot say, that I have ever seen such an occurrence.

CHAP. L.

CIRSOCELE AND VARICOCELE.

THE latter term implies nothing more, than a preternatural dilatation of the blood-vessels of the scrotum. These, like the vessels in other parts of the body, are liable to become varicose; but, they are seldom so much enlarged as to be troublesome, unless such enlargement is the consequence of a disease, either of the testicle, or of the spermatic cord. In this circumstance, the original disease claims our attention, and not this simple effect of it; and, therefore, as Mr. Pott observes, the varicocele, considered abstractedly, is a disease of no importance.*

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* See Sharp's Treatise of the Operations, p. 51, edit. 3; Bertrandi, Traité des Operations de Chirurgie, p. 209, Paris 1784.

† Bertrandi, loco cit.

The cirsocele is a varicose distention and enlargement of the spermatic veins. It frequently occasions great uneasiness, and sometimes a wasting of the testicle. It is commonly limited to that part of the spermatic cord, which is below the abdominal ring; and the vessels are generally larger, the nearer they are to the testicle.

The enlargement of the spermatic veins is more frequently mistaken for an omental hernia, than any other disease. A friend of mine, who was in the army in Bengal, put himself to the expence of returning to England, in consequence of his having been told by the surgeons in India, that he had a rupture, while, in fact, his complaint was merely a varix of the spermatic veins.

Cirsocele, as an eminent surgeon has remarked, resembles, in several respects, a hernial tumor. When large, it dilates upon coughing; and it appears in an erect, and retires in a recumbent, posture of the body. The same surgeon observes, that there is only one sure method of distinguishing the two complaints: place the patient in a horizontal posture, and empty the swelling by pressure upon the scrotum. Then put the fingers firmly upon the upper part of the abdominal ring, and desire the patient to rise: if it is a hernia, the tumor cannot re-appear as long as the pressure is continued at the ring; but, if a cirsocele, the swelling returns with increased size, on account of the return of blood into the abdomen being prevented by the pressure.†

Cirsocele is attended with a sense of weight in the scrotum; an unequal knotty swelling; and, if the disease affects the whole corpus pampiniforme, with a feel that seems to arise from a bundle of ropes, or cords. Excepting the uneasy sensation of weight in the scrotum, the recent cirsocele is productive of only trivial, or even no inconvenience. But, in an advanced state of the disease, very severe pains gradually come on, sometimes extending upward to the back and loins, and downward to the thigh.

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* Pott's Chirurgical Works, vol. 2, p. 383, edit. by Earle, 1808.

† See A. Cooper's Anatomy and Surgical Treatment of Inguinal and Congenital Hernia.

TREATMENT OF CIRSOCELE.

A radical cure can seldom be effected. When the disorder occasions pain, cold, saturnine, and alum, lotions should be applied over the testicle and cord; blood should be repeatedly taken away by means of leeches; the bowels should be kept gently open; the patient should be placed in a horizontal posture; and the testicle should be supported with a bag truss.

In ordinary cases, supporting the testicle with this kind of suspensory bandage, is the only thing, to which the patient finds it necessary to attend.

One can hardly suppose a case so severe, and incapable of palliation, as to require the performance of castration, though such instances are mentioned by very good authors.

CHAP. LI.

HERNIA HUMORALIS, OR INFLAMED TESTICLE.

SYMPTOMS.

THE first symptom is generally a soft, pulpy, fulness of the body of the testicle, which is exceedingly tender when handled. This fulness increases to a hard swelling, accompanied with considerable pain. The hardest part is commonly the epididymis, and principally the lower portion of it, as may be distinctly felt. The spermatic cord is often affected, and particularly the vas deferens, which is thickened, and painful when touched. The spermatic veins, according to Mr. Hunter, sometimes become varicose. A severe pain in the loins is usually attendant on the complaint. The scrotum, in consequence of the distention, which it suffers, becomes smooth, loses its corrugated appearance, and becomes redder, than in the healthy state.

CAUSES.

The causes of inflammation of the testicle are, for the most part, similar to such as excite this affection in other parts. A bruise may occasion a hernia humoralis; we see it purposely caused by the surgeon, when he undertakes the radical cure of a hydrocele. But, the most common cause of this complaint is irritation in the urethra. Hence, it more frequently arises in consequence of a gonorrhœa, than any other cause; and persons with very bad strictures, for which they are using bougies, are particularly exposed to its attack. It is very remarkable, that, in cases of gonorrhœa, the pain in making water, and the quantity of the discharge, are almost always very suddenly diminished, as soon as the testicle begins to enlarge; the discharge, indeed, is frequently quite stopped. This curious circumstance has attracted a great deal of attention, and has been repeatedly adduced by theorists as a proof of the *metastasis* of a disease, or of a sympathy between the testicle and urethra. Leaving these abstruse points to the consideration of such readers as may feel inclined to theorize upon the subject, I shall rest contented with merely knowing and mentioning the fact, that the occurrence of hernia humoralis usually produces a sudden, and considerable, diminution, and even a total cessation, of the strangury, and discharge from the urethra, in cases of gonorrhœa. This amendment, in the latter complaint, continues till the vehemence of the hernia humoralis has abated, and then the pain in making water, and the copious discharge, frequently recur.

In a few cases, the swelling of the testicle is not followed by any diminution of the discharge from the urethra.

TREATMENT OF HERNIA HUMORALIS.

The patient should be kept perfectly quiet, and in a horizontal posture in bed. If he be young and robust, the swelling of the part considerable, and the pain in the loins very violent, phlebotomy may be practised. In almost every case, however, bleeding with leeches is to be repeatedly put into practice, and saline purgative medicines administered. As far as my own observations extend, fomentations and poultices prove more beneficial, than cold saturnine lotions. But, an object, of the highest importance, is to keep the testicle constantly supported, by means of a bag truss, or suspensory bandage. This often relieves the violent pain in the loins, in a most surprising manner, and is a measure, which should never be neglected.

Mr. Hunter states, that emetics have been known to remove the swelling almost instantaneously. Without giving full credit to the literal meaning of this observation, it is very certain, that the great degree of swelling, in cases of hernia humoralis, often occurs and subsides more rapidly, than in any other inflammatory affection whatever.

When the pain in the part and loins is unusually vehement, opiates become necessary.

After the inflammation is completely subdued, the induration of the epididymis commonly remains. Sometimes, this may be lessened by frictions with camphorated mercurial ointment; but, in general, more or less of the hardness continues during life. Mr. Hunter suspected, that some testicles, which remain indurated at the epididymis, are rendered totally useless, by the cavity of the latter part being in an impervious state.

CHAP. LII.

OF CANCER SCROTI; CHIMNEY-SWEEPERS' CANCER; OR SOOT-WART.

THE chimney sweepers' cancer was first described by the celebrated Mr. Pott. It is said to be endemial in this country; a circumstance, that is ascribed to the particular kind of soot which arises from the vast quantities of sea-coal here consumed as fuel. At all events, the disease has never been noticed in France;* and Ramazini, who published in Italy, respecting the disorders, to which workmen are particularly exposed, makes no mention of the cancer scroti.†

This disease almost always makes its first appearance in the inferior part of the scrotum, where, as Mr. Pott observes, it produces a superficial, painful, ragged, ill-looking sore, with hard and rising edges. With the exception of one case, which was shewn to him by Sir J. Earle, and which occurred in a child under eight years of age,‡ that eminent surgeon never saw the complaint occur under the age of puberty. In no great length of time, it makes its way completely through the scrotum, and attacks the testicle, which it enlarges, hardens, and renders thoroughly distempered. Next, it extends up the spermatic cord, contaminating the inguinal glands, and parts within the abdominal ring, and then very soon becoming painfully destructive.

It is supposed, that this terrible malady commonly derives its origin from the lodgment of soot in the rugæ of the scrotum. Hence, at first, it must be entirely of a local nature.

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* Richerand, Nosographie Chirurgicale, tom. 4, p. 290, edit. 2.

† De Morbis Artificum.

‡ See Pott's Chirurg. Works, by Earle, vol. 3, note p. 178, edit. 1808.

It is proper to observe, that though this peculiar disease hardly ever occurs, except on the scrotum, two rare examples have been recorded by Sir J. Earle, in which the distemper happened in other situations. In one instance, it attacked the face; in another, it took place on the back of the hand.*

Mr. Pott believed the malady was confined to chimney sweepers; but, Sir James Earle has seen it in other descriptions of persons. In these, however, the origin of the complaint was traced to the action of soot.

TREATMENT.

Mr. Pott remarks, that if there be any chance of putting a stop to the above mischief, it must be the immediate removal of that part of the scrotum, where the sore is; for, if it be suffered to remain until the testicle becomes affected, the performance even of castration will generally be too late. Mr. Pott states, that he has many times made the experiment, and that though the wound made by such operation sometimes healed favourably, yet, in the space of a few months, the patients returned either with the same disease in the other testicle, or in the glands of the groin, or with such a diseased state of the viscera, as soon ended in a painful death.

I have never seen this disease materially benefited by any medicines, or topical applications; and I am, therefore, strongly impressed with the propriety of an early removal of the affected part of the scrotum. The loss of a portion of this part can never be attended with future inconvenience; and, as Mr. Pott most justly observes, it is a very good and easy composition for the preservation of life.

When the malady has made too much progress to admit of extirpation, only palliative treatment can be pursued, and such medicines and applications, as are recommended in the chapter on cancer, may be employed.

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* Lib. cit. p. 178—182.

CHAP. LIII.

GONORRHŒA, OR CLAP.

WHEN an irritating matter of any kind is applied to a secreting surface, the natural secretion becomes increased in quantity, and altered in quality; and when the ordinary mucous secretion of the urethra is, in this manner, changed into a fluid, resembling pus, the disease is named a *gonorrhœa*, or *clap*.

The complaint is commonly supposed to arise in consequence of the application of venereal matter to the urethra. However, common preternatural discharges from the urethra may result from any kind of irritation in that canal. Strictures, and the employment of bougies, are both very frequent causes of what might be termed a gonorrhœa. Indeed, that various discharges from the urethra, attended with pain, and a sense of scalding in making water, were common, prior to the introduction of the venereal disease into Europe, is a fact, of which irrefragable confirmations exist.* Whether there is a species of gonorrhœa, that is truly syphilitic, is still a contested point.

When the complaint follows some species of contamination, contracted in coition, it usually commences about six, eight, ten, or twelve days afterwards; but, it is capable of affecting some persons much sooner, and others much later.

The first symptom is usually an itching at the orifice of the urethra, sometimes extending over the whole glans penis. A little fulness of the lips of the urethra is next observable. Very soon after the discharge has appeared, the itching changes into pain, especially, at the time of voiding the urine. The penis, and, particularly, its glans, seem swollen. The latter part has a transparent appearance around the mouth of the urethra, the skin seeming distended, smooth, and red, like a ripe cherry. Sometimes, the glans is, more or less, excoriated, as well as the beginning of the urethra. This canal becomes narrower, as is proved by the stream of urine being smaller, than common, and the circumstance is owing to two causes, viz. the swollen state of the lining of the canal, and its spasmodic contraction. Small swellings are often observable along the lower surface of the penis, in the course of the urethra. These were suspected by Mr. Hunter to be the enlarged glands of that canal. Cowper's glands in the perineum, in some instances, also inflame and suppurate.

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* See particularly the three Dissertations of Mr. Wm. Becket, in the 30th and 31st volumes of the Philosophical Transactions.

The natural discharge from the urethra is first changed from a transparent viscid secretion, to a watery, whitish, pellucid fluid; and this, becoming gradually thicker, assumes the appearance of pus. The matter often changes its colour and consistence; sometimes it is almost white, sometimes quite yellow, and, in other instances, greenish.

Mr. Hunter was of opinion, that, in ordinary cases, the morbid affection of the urethra did not extend very far along this canal from the orifice, perhaps, about an inch and a half, or two inches. This is, what he named, the *specific extent* of the inflammation.

Besides the symptoms already mentioned, there is a very acute, scalding pain experienced in making water, which can often only be discharged by drops, or in an extremely small broken stream. The patient is also obliged to void his urine very frequently.

A variety of other affections are occasionally produced in the neighbouring parts: pain, soreness, and uneasiness, are sometimes experienced all over the pelvis; and the scrotum, testicles, perineum, anus, and hips, become disagreeably sensible. The testicles often require being suspended, and are so irritable, that the least exertion makes them swell. The inguinal glands often enlarge; and, in this case, the swelling is termed a *sympathetic bubo*. The bladder occasionally becomes unusually irritable, and cannot bear the least distention, so that the patient is, almost every five minutes, obliged to make water with violent pain in the bladder and glans penis. This pain frequently continues after the urine is discharged.

OF THE POWER OF THE MATTER OF GONORRHŒA TO COMMUNICATE THE VENEREAL DISEASE.

The arguments, in support of this doctrine, are, first, the probability, that the Otaheiteans had the venereal disease propagated to them by European sailors, who were affected with gonorrhœa; for, these could hardly be supposed to have a chancre, during a voyage of five months, without the penis being destroyed. Secondly, Mr. Hunter mentions a gentleman, who had a gonorrhœa thrice, of which he was cured without mercury. About two months after each infection, he had symptoms of lues venerea. The first were ulcers in the throat; the second were blotches on the skin; both which forms of the disease yielded to mercury. Thirdly, two punctures were made on the penis, with a lancet dipped in the matter of a gonorrhœa. One of these produced, on the part of the prepuce, where it was made, a red, thickened speck, which increased and discharged some matter. This supposed chancre healed on having its surface repeatedly destroyed with caustic. The other puncture was made on the glans, where it was followed by a pimple, full of yellowish matter. This pimple was touched with caustic, and healed in the same way as the sore on the prepuce. Four months afterwards, the chancre on the prepuce broke out again; then it healed, and returned. This it did several times; but, always healed, without any application to it. While the sores remained on the prepuce and glans, a bubo formed in the groin. A sufficient quantity of mercury was given to cure the gland locally; but, not to prevent the constitution from being affected. Two months after the cure of the bubo, a venereal ulcer, according to Mr. Hunter, formed on one of the tonsils. This was cured by mercury; but, the medicine was purposely left off as soon as the sore was skinned over, in order to see what parts would next be affected.

About three months afterwards, copper-coloured blotches made their appearance in the skin, and the ulcer on the tonsil recurred. This disease was again only palliated by mercury; but, the complaints returned in the same situation as before; and were ultimately cured by a proper quantity of mercury.

On the other hand, doubts must exist concerning this account of the matter of gonorrhœa, when the following circumstances are taken into consideration:

1st. It is impossible to say, what time may elapse, between the application of venereal poison to the penis, and the commencement of ulceration. Therefore, Bougainville's sailors, alluded to by Mr. Hunter, might have contracted the infection at Rio de la Plata; but, actual ulcers on the penis might not have formed till about five months afterwards, when the ship arrived at Otaheite. 2dly. The second argument adduced by Mr. Hunter is certainly inconclusive. Every ulcer in the throat is not regularly venereal. A common ulcer may heal while the patient is using mercury. Hence, the cure, apparently accomplished by this medicine, is no proof, that the complaint was syphilitic. 3dly. The last fact of inoculation is undoubtedly very strong. But, though the insertion of gonorrhœal matter, or any other morbid matter, beneath the cuticle, will undoubtedly produce troublesome local complaints, may we not doubt, that the sores, in the above case, were actually venereal ones? Can we implicitly depend on the continence of the subject of the above remarkable experiments, during the long spade of four months, between the healing of the sore on the prepuce, and its recurrence? If we cannot, the inference, in regard to the power of gonorrhœal matter to communicate the venereal disease, remains unestablished. How much more conclusive, in this respect, the experiments would have been, had the inoculation been practised on any other part, instead of the penis. If the matter of gonorrhœa be capable of communicating the venereal disease, why does not the discharge commonly produce chancres on the glans and prepuce, with which parts it must lie in contact a very considerable time in every case? Why also does not the presence of a chancre frequently cause a gonorrhœa? If the infection of a gonorrhœa, and the venereal disease, be really of the same identical nature, certainly, it seems very extraordinary, that the former complaint should receive no benefit from mercury, and the latter disease invariably require this specific remedy.

TREATMENT.

The gonorrhœa is one of those peculiar diseases, which seem to have no specific remedy; but, which, at the same time, have a propensity to get spontaneously well in a certain time. The complaint, however, is evidently of an inflammatory nature; and though we cannot at once effect a cure, we may palliate the symptoms, and shorten their duration, by adopting certain antiphlogistic means in the first stage of the affection.

Linen, wet with the saturnine lotion, should be kept constantly applied to the penis. The patient should keep his bowels well open with saline purges; live more abstemiously than common, avoiding spirituous drinks, and all spicy food; and render the quality of his urine as little irritating as possible, by taking in the course of the day copious draughts of some diluting beverage, such as barley water, mucilage of gum arabic, &c.

After a few days, some attempt may be made to alter the action of the vessels of the lining of the urethra, so as gradually to incline them to secrete again the healthy mucous fluid, with which the canal is naturally lubricated, instead of a purulent discharge. For this purpose, astringent injections may be applied. The most common is that containing the zincum vitriol.; and, for first use, not more than five grains of this salt should be dissolved in four ounces of water. The application may afterwards be gradually strengthened. When this injection does not seem to produce much good, another one, containing the hydrargyrus muriatus sometimes answers better One grain of this substance, in eight ounces of distilled water, forms a fluid sufficiently strong for first employment. Another very good astringent injection is composed of fourteen grains of saccharum saturni, dissolved in eight ounces of water.

As injections are only temporary applications, it is evident, that they ought to be very frequently used. At first, however, two or three times a day will suffice. The mouth of the syringe should not be pressed against the orifice of the urethra, as it creates a great deal of irritation, and even sometimes ulceration.

When the strangury is very severe, and there is trouble from nocturnal erections, chordee, &c. opium should be given.

Excepting opium and the balsam. capaiv., I have never seen any internal medicines produce manifest and unequivocal good in cases of gonorrhœa.

CHAP. LIV.

GLEET, CHORDEE, SYMPATHETIC BUBOES, BLADDER AFFECTED IN GONORRHŒA.

SOMETIMES, after the cure of the specific inflammation of the urethra, upon which gonorrhœa is supposed to depend, a discharge still continues, and, though unattended with pain, is often exceedingly difficult of cure. A gleet is essentially different from a gonorrhœa in not being infectious, and in consisting of a discharge, which is composed of globules, blended with the mucous secretion of the part. The discharge, in cases of gonorrhœa, on the other hand, has the power of infection, and is composed of globules, mixed with a serous fluid.

TREATMENT.

Stimulating injections may be tried. Two grains of the hydrarg. mur. dissolved in eight ounces of distilled water, form a very suitable application. Injections frequently produce a temporary cessation of a gleet, and the complaint soon afterwards recurs. On this account, patients should not relinquish their use too soon, on the supposition of their being permanently well. It is generally advantageous to continue to employ the injection for two or three weeks, after the complete stoppage of the discharge. In some instances, sea water makes a more efficacious injection, than any other. It was very common formerly to introduce bougies, medicated with turpentine or camphor, and about four or five inches long, into the urethra, with a view of irritating the lining of this canal, and altering the mode of action in the vessels. However, the practice has gone a good deal into disuse, and this is a strong test of its not having been productive of more, or even so much, efficacy as injections, which can be used with less trouble.

At the same time that injections are employed, the surgeon may direct the patient to take thirty drops of the balsam. copaiv. thrice a day; or the tinct. catharid., beginning with a dose of ten drops thrice a day. If these medicines produce no good, though taken regularly for a week or ten days, they may be discontinued, as affording no hope of their becoming useful afterwards.

Many gleets will not yield to the above plan of treatment. Patients, so circumstanced, may try cold bathing (if possible, in the sea), and rough horse exercise. If debilitated, they should take bark and steel. Electricity, and even blistering the skin underneath the urethra, are recommended in very inveterate cases.

CHORDEE.

In cases of gonorrhœa, when the inflammation is not confined merely to the surface of the urethra and its glands; but, affects the reticular membrane, it produces in the latter part an extravasation of coagulating lymph, which unites the cells together, destroys the power of distention of the corpus spongiosum urethræ, and makes it unequal, in this respect, to the corpora cavernosa penis. Hence, a curvature takes place, at the time of an erection, and is termed a chordee. The concavity of the curvature is, generally, at the lower part of the penis.

TREATMENT.

When much inflammation is present, bleeding from the arm, and, more especially, from the part itself, by leeches, is proper. The penis may be exposed to the steam of hot water. Camphorated fomentations and poultices are also very beneficial applications. At the same time, opium and camphor may be given as internal medicines.

When all inflammation has been subdued, the indication is to effect the absorption of the coagulating lymph; and, for this purpose, nothing is better, than friction on the part with camphorated mercurial ointment.

SYMPATHETIC BUBO.

Gonorrhœa is sometimes attended with a swelling of the inguinal glands, termed a *sympathetic bubo.* This complaint is supposed to originate from mere irritation, and not from the absorption of matter. We know, that the lymphatic glands are capable of becoming inflamed in this manner; for, in various diseases, we see them frequently swell at a more remote situation from the thoracic duct, than the local complaint, which is the exciting cause of their enlargement. The pain, which sympathetic swellings of the glands occasion, is much less, than that arising from the true venereal bubo. Such swellings also seldom suppurate.

Mr. Hunter was of opinion, that the real venereal bubo might sometimes take place, in a case of gonorrhœa, in consequence of the absorption of matter.

TREATMENT.

Whatever may be the nature of the sympathetic bubo, certain it is, that mercury is by no means necessary in the treatment. The swelling may be reduced by the repeated application of leeches, and keeping up a continual evaporation from the part, by means of linen, wet with the saturnine lotion. In short, the case is to be treated as a simple phlegmonous inflammation.

BLADDER AFFECTED IN GONORRHŒA.

Opiate clysters, the warm bath, phlebotomy, if the patient be young and robust, and leeches applied to the perineum, are the most eligible measures to be adopted. In cases, in which the affection continues very long, an opiate plaster may be applied to the loins, or a small blister to the perineum.

When the irritability of the bladder exists alone, and for a long while, opiate clysters, cicuta, bark, sea-bathing, and a blister on the perineum, are proper.

A scruple, or half a dram of the powder of uva ursi, has been recommended to be given, three times a day, when the bladder is extremely irritable, in consequence of a gonorrhœa.

CHAP. LV.

PHYMOSIS AND PARAPHYMOSIS.

WHEN the opening of the prepuce is so much contracted, that this part cannot be easily drawn backward so as to uncover the glans, the complaint is termed *phymosis*. On the other hand, when the prepuce is drawn backward, behind the glans, and cannot be brought forward again, the malady receives the name of *paraphymosis*.

These diseases often arise from a thickening of the cellular substance of the prepuce, in consequence of some species of irritation. This is most frequently produced by a chancre; but, it is also very often the result of a common gonorrhœa, or of inflammation and excoriations beneath the prepuce, which are common in persons who neglect cleanliness, and allow the natural sebaceous secretions to lodge and become acrid. The inflammation of the prepuce is sometimes vehement, and of the erysipelatous kind, and in many instances, the part has an anasarcous appearance, owing to the extravasation of serum.

Many persons are born with a contraction of the aperture of the prepuce; and the case is then called a *natural* or *congenital* phymosis.

The paraphymosis very frequently follows the phymosis, by the prepuce being improperly drawn backward behind the glans. In this circumstance, the constricted part of the prepuce acts as a ligature round the body of the penis, and retards the return of blood from the glans, and the portion of the prepuce beyond the stricture. Hence, an œdematous inflammation attacks the latter, and the former part becomes prodigiously distended. Sometimes, in adults, and particularly, in old persons, the prepuce contracts so much, without any evident cause, that its cavity becomes filled with urine during the act of making water, and great pain is produced.

In cases, where the opening is exceedingly small, it is by no means an uncommon circumstance for calculi to be formed under the prepuce, and, it is alledged, that they sometimes resemble, in shape, the glans, on which, as it were, they are moulded.* When the phymosis is congenital, and has existed a long while, it frequently happens, that, in consequence of inflammation, adhesions have taken place between the glans and the prepuce, and, in this event, it may not always be in the surgeon's power to effect a cure. The possibility of doing so must depend in a great measure, upon the extent and firmness of the adhesions. According to Richerand, it is seldom practicable to destroy them, after the patient has attained the age of puberty.

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* Richerand, Nosographie Chirurgicale, tom. 4, p. 303, edit. 2.

A phymosis is not unfrequently productive of bad consequences, especially, when it is attended with chancres behind the glans. The latter part, being situated between the sores and the orifice of the prepuce, frequently prevents the pus from finding its way outward, consequently, there is an accumulation of matter behind the corona glandis; and this kind of abscess produces ulceration on the inside of the prepuce. When the matter bursts externally, the glans often protrudes through the opening, throwing the whole prepuce to the opposite side.*

Sometimes, paraphymosis is the occasion of worse consequences, viz. mortification of the prepuce, including the part forming the stricture.

In numerous books, written by very modern surgeons, we find it stated, that the above complaints are almost always owing to a venereal taint. From the preceding account, however, it is sufficiently clear, that any cause, occasioning an inflammation and swelling of the prepuce, may give rise either to a phymosis, or paraphymosis; and that, of whatever nature the cause may be, the effect itself is always quite free from all venereal taint.

TREATMENT OF PHYMOSIS.

No operation ought to be practised on children for the natural phymosis, unless great inconvenience should immediately result from the malformation. It is very certain, that the constriction frequently goes off, as such subjects approach the adult state.

When a phymosis originates from the irritation of a chancre, a gonorrhœa, or excoriations underneath the prepuce, the best treatment consists in making the patient remain quietly in bed, very frequently injecting the saturnine lotion underneath the prepuce, and applying linen, wet with this remedy, round the penis. These measures are not to interrupt the exhibition of mercury, when chancres are known to exist. When the patient is not taking the latter medicine, he should not neglect to keep his bowels well open. When a phymosis is occasioned by the lodgment of acrid, sebaceous matter, beneath the prepuce, nothing produces relief, more expeditiously, than uncovering the corona glandis, if possible, and washing the part with soap and water. Then the employment of the saturnine lotion, both a san injection and a lotion, for keeping the inflamed part cool, will very soon accomplish a cure.

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* Hunter's Treatise on the Venereal Disease, p. 223, edit. 2.

From the extensive sloughing, which I have frequently seen follow operations, performed on the prepuce, during its inflamed and œdematous state, in cases of phymosis, I have no hesitation in asserting, that such practice is generally very injudicious and hurtful. No inflamed phymosis can ever require the employment of the knife,* if we exclude the particular instance, in which the matter accumulates under the prepuce, and cannot make its exit, except by an ulcerative process. The application of dressings to sores is never a sufficient reason; for, these may be washed and kept clean, by frequently injecting suitable lotions under the prepuce; and, if they are chancres, they will almost always heal, when thus treated, and a due quantity of mercury has been exhibited.

When matter is completely confined beneath the prepuce, behind the glans, a puncture may be made into the collection of pus with a lancet, and, through this opening, proper lotions may be injected.

The cases, which require an operation, are such as are natural, and do not amend as the patient advances to the adult state; such as occur without acute inflammation, and to all appearances, spontaneously; and others, which arise from the puckering of the prepuce, in consequence of former ulcerations.

OPERATION FOR THE PHYMOSIS.

Until very lately, surgeons used ordinarily to slit open the prepuce with a curved bistoury, a little on one side of the centre of its upper part.† This method, it is obvious, would leave too very inconvenient flaps or angles.

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* It is proper for me to state, however, for the information of the student, that this observation is repugnant to the precepts delivered on the subject by all the most eminent writers on surgery, and is in opposition to common practice. I would, therefore, wish the remark to receive only that degree of credit, to which it may be entitled, as coming from an individual, against whom all the highest authorities might be brought.

† "It is much safer to make the wound on one side of the prepuce, than upon the upper part; for, I have sometimes seen the great vessels on the dorsum penis afford a terrible hemorrhage." Sharp's Treatise of the Operations, chap. 11.

The deformity of the prepuce, occasioned by this mode of operating, and the annoying friction, which the angles of the part are continually exposed to, have been such as to induce some surgeons to recommend the attempt to unite the divided part of the prepuce again. Fabricius ab Aquapendente advised a patient, who was thus incommoded, to submit to an operation, resembling that for the hare lip;* but, the author does not state, whether it was actually performed. However, Bertrandi was acquainted with a surgeon at Paris, who endeavoured to re-unite the part, by means of the twisted suture; but could not succeed.†

The best modern operators, in this metropolis, prefer circumcision. The prepuce is taken hold of with a pair of forceps, and as much of the part being left out as seems necessary to be removed, the surgeon cuts a complete circle of the prepuce off by one stroke of the knife, and if the inner membrane of the prepuce should appear still to be too tight, it must be divided with a curved knife. The external skin of the part is then usually prevented from becoming separated from the inner layer by a fine suture, introduced through both their edges. In the cases, which have fallen under my observation, it has seldom been necessary to tie any vessel. Bertrandi cut off the whole prepuce, in three instances, but, without any bleeding of importance.‡

TREATMENT OF THE PARAPHYMOSIS.

This case may very often be at once relieved, by compressing as much of the blood as possible out of the glans penis, and then pushing the part back again through the stricture. In order to perform this operation adroitly, the surgeon should first make continued pressure on the glans, by placing it between the ends of the thumb, index, and middle fingers, of each hand. The whole surface of the part should thus be gradually compressed, at the same time, for the space of four, or five minutes. Then, the two thumbs are to be employed, both in pushing backward the diminished glans, and, together with the fingers, in drawing forward the prepuce.

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* De Chirurg. Operationibus, cap. 61.

† "Un chirurgien de mes amis, à Paris, ayant fait en pareil cas cette suture, eut le déplaisir, et le malade la douleur, d'en voir les points déchirés par un priapisme malencontreux." Traité des Opérations de Chirurg. p. 238.

‡ Lib. cit. p. 243.

I cannot say, that I have ever seen more than one case, in which this plan, when properly tried, did not succeed.

When the attempt fails, leeches should be applied to the glans, and the flow of blood be afterwards promoted by immersing the penis in warm water. After these measures, the above method will frequently succeed. However, if it should not, and no danger of gangrene should be present, the surgeon must be content with covering the penis with linen kept constantly wet.

When the œdemateous swelling increases, instead of diminishing, the only method of preventing mortification of the glans and prepuce, is to make an incision just behind the former part, through the portion of the prepuce, forming the constriction. A small scalpel is the best instrument, and care must be taken to cut to a sufficient depth.

CHAP. LVI.

AMPUTATION OF THE PENIS.

IT is very generally set down, in surgical books, that cancer, and mortification of the penis, are the two causes, for which this operation is required. That the first is frequently a proper reason for amputating the penis, no man can question; but, that mortification is so, every reflecting surgeon will deny. The mortified part will separate, and the living surface cicatrize afterwards, fully as well, as if the patient were to submit to a painful operation.

When the case is a scirrhous, or cancerous disease, the prospect of a perfect cure will greatly depend upon the testicles, and glands in the groin, being free from induration. I have never seen this operation performed, except once, and in that instance, the disease had extended to the testicles and inguinal glands, so that though the patient got rid of the disease situated on the penis, the disorder continued to increase in the groin and scrotum, until life was exhausted.

The operation is an extremely simple one. The surgeon commences by making an incision through the skin, all round that part of the penis, at which it is judged most advisable to amputate the part. The skin is then to be drawn a little towards the pubes, and exactly at the margin of the integuments, the operator is to make a complete division of the corpora cavernosa, and rest of the penis.

Some writers dissuade us from drawing the skin at all back, before dividing it; but, the preceding mode is that, to which I should give the preference, in order to be able to cover the end of the corpora cavernosa with sound integuments.

The bleeding will necessarily be rather profuse; but, there is never very great difficulty in suppressing it.

The superficial branch of the internal pudendal artery, situated on the dorsum of the penis, and two arteries near the septum of the corpora cavernosa, ordinarily require a ligature. The hemorrhage, from the cells of the corpora cavernosa, may be stopped by applying scraped lint.

In order to prevent a closure of the urethra, as well as to enable the patient to make water easily, and keep the urine from coming into contact with the wound, it is advantageous, after the operation, to introduce a short silver cannula into this canal. The cannula must be made with little rings, that it may be conveniently fastened in its situation.

Perhaps, a flexible gum catheter might be preferable to a metallic tube, since it would certainly create less irritation. It should be noticed, however, that some authors have represented the employment of any kind of tube as useless, and detrimental; but, the irritation, which the wound would suffer from the urine, without an instrument to conduct this fluid out, will probably always lead the best practitioners to continue to introduce a cannula, or flexible gum catheter, after amputating the penis. Le Dran also mentions a case, in which the orifice of the urethra became impervious, so that the urine could not be discharged, in consequence of the neglect to introduce a cannula.* If the operator should determine not to use such an instrument, he must not attempt to save skin, as, when this is brought forward, it would obstruct the exit of the urine.

CHAP. LVII.

STRICTURES OF THE URETHRA.

A DIMINUTION of the diameter of the urethra, produced by folds, or thickenings of the internal membrane of that canal, is an exceedingly common disease, that has been described by numerous writers. It is even mentioned by Hippocrates.*

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* Operations in Surgery, p. 158, edit. 2.

It is the prevailing opinion, that the urethra is muscular, and naturally possesses a power of contraction and relaxation. When any part of this canal is affected with a spasm, says Mr. Home, it loses the power of relaxing itself, in a due degree, and a *spasmodic stricture* is the result. While a stricture is in this stage, it is only a wrong action of the membrane of the urethra; and, if the parts could be examined in their relaxed state, there would be no appearance of disease.

The second kind of stricture is both *permanent* and *spasmodic*; so far permanent, that the affected part of the canal is always narrower than the rest; and, so far spasmodic, that this same part is liable to contract occasionally in a still greater degree.

When the simple narrowness of the canal becomes a ridge, forming a continual projection, the case is a *true permanent stricture*.† The disease generally occupies no great length of the passage, not extending further, than if it were produced by the urethra being surrounded with a piece of packthread. However, though this is the common occurrence, the urethra, in some instances, is, undoubtedly, contracted for more, than an inch of its length.‡ In certain cases, the canal widens very gradually in each direction from the most contracted point, so that the shape of this part of the tube may be considered as resembling two long cones, with their points in contact. I am perfectly convinced, that this is the case, which frequently baffles the operation of caustic, and which receives most benefit from the employment of common bougies. A stricture may also arise from a contraction of only one side of the urethra. Whenever there is only one stricture, it is most commonly just behind the bulb of the urethra; the distance from the external orifice being six and a half, or seven inches. Whenever there are other strictures further forward, which is mostly the case, a stricture, which may be considered as the original one, will almost always be found to exist at the above part of the canal.

A true permanent stricture, unless very inveterate, or so advanced as to have rendered the urethra impervious, and to have occasioned fistulous openings in the perineum, is strictly capable of a further spasmodic, or muscular contraction. This is clearly proved, by all strictures being less troublesome in warm, than in cold weather. The fit of an ague, violent exercise, hard drinking, and retaining the urine too long, after an inclination to void it has been felt, are all circumstances capable of aggravating the inconveniences of strictures, by adding a spasmodic kind of contraction to that, which is permanent.

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* Vid. Aphor. 81, sect. 4.

† Practical Observations on the Treatment of Strictures, &c. vol. 1, p. 20, 21, edit. 2.

‡ Mr. S. Sharp, in speaking of strictures, observes, that they "happen sometimes to a small portion of the passage only; at other times, *to a very considerable length of it*; and, frequently, to three, or four different parts of it." See Critical Inquiry into the present State of Surgery, p. 145, edit. 4.

Many doubts have been entertained, concerning the muscularity of the membrane of the urethra, because such structure cannot be demonstrated. Hence, some writers have explained the formation of strictures altogether, by the effects of inflammations on that canal, and have rejected the idea, that the disease is ever the result of a spasmodic contraction of any unproved circular fibres of the membrane lining that passage. Others seem to admit, that the urethra has a power of contraction; but, contend that it is not necessary to impute it to the muscular structure of the membrane of that canal. It is said, that the common integument, and the hydatid, without being supposed to be muscular, have a power of contraction on the application of certain stimuli. An attempt is made to account for the spasmodic affection of strictures, by the urethra being embraced by muscles at that part, which is peculiarly, if not exclusively, the seat of spasm. Are not strictures, it is observed, met with in the ductus nasalis? And yet its lining has never been supposed by any body to be muscular.* Notwithstanding the ingenuity of such objections, and the unsatisfactory, or rather imperfect explanation of the formation of strictures, given by Mr. Home, I cannot help thinking, that the evidence of reason is decidedly in favour of the muscularity of the membrane of the urethra. In the first place, no anatomist will decidedly maintain, that a canal, a tube, or a vessel, is not muscular, because he cannot see muscular fibres.† The functions of the part afford him a better criterion. In the second place, there are certain phenomena, which cannot be explained by the contraction of any of the muscles, with which the urethra is embraced. I shall here only advert to the following: a bougie may frequently be easily introduced as far as a stricture; the patient suffers little uneasiness, and no resistance is experienced; but, no sooner is the passage irritated by the pressure of the bougie against the obstruction, than it contracts, and grasps the instrument with manifest force. Much resistance is now made to the withdrawing of the bougie, and it is continued, in a great measure, till the instrument is quite out of the urethra. This fact I have many times noticed. Did the resistance depend on a spasm of the muscles in the perineum, it could only last, while the bougie was in the contiguous part of the urethra. We find, however, that even the last inch of the bougie is evidently grasped.*

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* See London Med. Review, vol. 1, p. 78.

† The muscular structure of the ureters cannot be demonstrated; yet, no one doubts, that they possess a contractile power. "Their function of conveying the secreted urine from the kidney to the bladder, (says an able writer), requires the exercise of tonic powers: the idea of this fluid finding its way by the force of gravity, is not only repugnant to the laws of the animal economy, but is irreconcileable with obvious phenomena. The adhesion of the sides of the tube, where it penetrates the coats of the bladder, presents an obstacle which can be overcome only by the exertion of some force; and

In delivering these observations, I would by no means wish to be thought an advocate for Mr. Home's superficial explanation of the matter. My belief is, that the membrane of the urethra is muscular; but, that this circumstance will not satisfactorily explain the mode, in which strictures are formed, unless we also take into the account the effect of inflammation in producing a thickening of parts.

SYMPTOMS OF STRICTURES.

The most early symptom is a diminution in the stream of urine, which, however, is usually disregarded, until the expulsion of this fluid is attended with some degree of difficulty. As the case

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this obstacle is vastly increased in the distended state of the bladder, during which the fluid is constantly finding its way into the receptacle. The only power in this case, by which the requisite end can be obtained, is a contraction of the canal." Rees's Cyclopædia, art. Kidney.

* Speaking of the controverted point, whether, or not, the urethra possesses a contractile power in its own lining, a valuable author observes, that "the phenomena are strongly in favour of the affirmative, although no muscular fibres have been demonstrated. The temporary obstruction to the flow of urine, under circumstances of disease, and the sudden cessation of this inconvenience, can hardly be explained, without allowing a contractile force to the membrane. The expulsion of instruments from the canal is another phenomenon of the same kind. That the urethra is extensible, and that it returns again to its original size, is proved by the passage of instruments. Haller states, that chemical stimulants will cause it to contract." See Rees's Cyclopædia, art. Generation.

advances, the evacuation is made more frequently, than is natural, requiring a considerable effort, and being accompanied with pain, and a straining sensation, which continues, for some time, after the bladder is emptied. Pain is particularly experienced, about an inch and a half from the glans penis, as in cases of gonorrhœa, and stone in the bladder. When the stricture is considerable, the urine flows out in a very small, spiral, or forked stream. A good deal of uneasiness is also frequently felt in the loins. A gleet is another very common attendant on the complaint. Patients, who have strictures, are often troubled with involuntary emissions of the semen during sleep. In some cases, the obstruction prevents the due ejection of this fluid in coition, and, it is not till some time after the orgasm, that the seminal secretion oozes gradually out of the mouth of the urethra, instead of being ejected with force at the proper period. In certain cases, the bladder is unusually irritable, and secretes from its inner membrane a very large quantity of viscid mucus, which is discharged with the urine.

As strictures are attended with several symptoms, which are common to gonorrhœas, and cases of stone, it is of great importance, that the surgeon should enquire, whether the urine ever issues in a full stream. If it should be found to do so, even though the stream may now be in a diminished state, and there may be difficulty in effecting the evacuation, it is quite clear, that there cannot possibly be a *permanent* stricture in an advanced state; for, this would *never* allow the urine to come away in a copious current.

Certain patients, afflicted with strictures, are extremely subject to complete paroxyms of fever; in other words, they often have a cold, hot, and sweating stage of febrile disorder in regular succession. The indisposition differs from an ague, in the sweating being much more profuse.

In some persons, strictures in the urethra occasion a swelling of the testicle.

A stricture, when permanent and considerable, is very apt to cause, under particular circumstances, strangury, and retention of urine. If a patient goes suddenly from a warm into a cold situation, if he drinks too freely of wine, eats high-seasoned dishes, catches cold, commits any species of intemperance, or delays making water too long, after feeling the inclination, he exposes himself to the danger of these latter grievances.

TREATMENT OF STRICTURES.

The first object, is to ascertain the precise situation of the stricture nearest the orifice of the urethra. For this purpose, a common bougie, proportioned to the size of the aperture of this canal, is to be gently introduced. If the bougie easily enters the passage, the surgeon may be well assured, that the size of the instrument is not too large, and that no impediment to its further introduction, can proceed from this circumstance; for, the mouth of the urethra is naturally one of its most narrow parts. Small bougies, and such as are too much pointed, are very apt to be stopped by the lacunæ, or orifices of the mucous glands, and to lead inexperienced surgeons into error.

In introducing any instrument properly into the urethra, some degree of skill is displayed. The surgeon should take hold of the penis, by placing the fore-finger and thumb of his left hand on each side of the prepuce, opposite the corona glandis; thus he avoids making any pressure on the passage, into which he is about to pass an instrument. This being oiled, is to be introduced a little way at first; then the surgeon is to draw the penis forward, as it were, over the bougie, with the index and thumb of his left hand, while, at the same time, he gently and steadily persists in pushing the instrument further into the passage with his right hand. A bougie is to be held like a writing pen, and, as it enters the urethra, it ought to be artfully rotated first in one direction, and then in the other, in order that its extremity may more certainly escape being entangled in any natural fold of the membrane lining the passage. Having ascertained, by the introduction of a bougie, the existence and situation of the stricture nearest the mouth of the urethra, the next desideratum is to learn, whether the contraction is such as would be produced by tying a piece of packthread round the canal; whether, on the other hand, it occupies a considerable extent of the length of the passage; and lastly, what is the size of the bougie, which can be introduced through it. It is on these latter circumstances, that we ought, in my opinion, to determine, whether the common, or caustic bougie, should be preferred. Soon after Mr. Home had recommended an almost unlimited employment of armed bougies, I made many trials of his plan on patients in St. Bartholomew's Hospital. In a few of these cases, I touched the strictures sixty, eighty, and even near a hundred times, without getting through them, although I followed the above gentleman's directions in a very strict manner. Most commonly, however, I found the caustic answer my expectations. Now, from reflecting on the manifest impotence of caustic to destroy a stricture, that occupies an inch or more of the canal, I have no hesitation in asserting, that, when a stricture is accompanied with a contraction of some extent, both before and behind it, the common bougie is generally preferable to the caustic one. The fear of a return of a stricture, when thus completely cured, has often seemed to me a supposititious and unfounded argument, and I have frequently suspected, that one great cause of a relapse, is, that surgeons do not continue to increase the size of the common bougie in the necessary degree. On the other hand, armed bougies have always been recommended to be of a full size, and, in this manner, some part of their permanent efficacy may be explained. Notwithstanding these sentiments, I shall recommend caustic bougies in the majority of ordinary cases; because, in these, the stricture is not more extensive, than if it were caused by a piece of packthread tied round the urethra, and, therefore, it can be advantageously and expeditiously cured by the application of caustic.

On account of the above reasons, and a conviction, that strictures, occupying some extent of the passage, are far more common, than has been supposed, I think every surgeon should endeavour to learn (before determining which sort of bougie he will use), whether the stricture is such a contraction as would originate from tying a piece of packthread round the canal; or whether it consists of a more extensive diminution of the passage.

Having ascertained, that a common-sized bougie will not pass beyond a particular point of the urethra, we ought to make an impression on the instrument with the nail, closely to the mouth of the urethra. Then the bougie should be withdrawn, and the surgeon should take one of a smaller size, which he is to mark with his nail, exactly at the place, corresponding to that of the impression on the first bougie. This smaller one is to be introduced so far as to bring its marked part exactly to the orifice of the urethra, at which period the surgeon knows, that the extremity of the bougie has just arrived at the contraction, which would not allow the first common-sized bougie to pass. If the second bougie cannot be introduced further than the first, a still smaller one is to be tried; but, the surgeon should not have recourse to the smallest bougies at once, as the largest bougie, which can be insinuated through the stricture, ought to be the model of the soft white one, which should now be introduced for the purpose of shewing the shape and extent of the stricture, by the impressions made upon it. If, after the soft bougie has remained a minute or two in the stricture, it should be marked with a distinct circular, or semicircular narrow furrow on being withdrawn, we have reason to believe, that the stricture does not occupy much of the extent of the urethra. However, whether there is any gradual conical diminution of the passage, in front of the most contracted part of the stricture, may be known by considering, whether the situation of the furrow, on the soft bougie, is exactly at the same distance from the mark made on it by the surgeon's nail, at the mouth of the urethra, as that other dent made by the surgeon's nail on the common-sized bougie, is from the end of this latter instrument. If the distance, between the impression of the stricture and the dent of the nail upon the soft bougie, is greater, than the space, between the end of the common-sized one, and the mark of the nail, we may conclude, that there is a diminution in the diameter of the urethra, in front of the most contracted part of the stricture, which causes the distinct impression. For this kind of case, I should certainly not recommend the caustic.

We must acknowledge, that it is somewhat difficult to ascertain, by means of bougies, whether the urethra is diminished in diameter, immediately behind the most contracted part of the stricture. For this reason, and because it seems obvious, that the method of treatment ought to be different in cases of strictures, confined to a point of the urethra, and in others occupying some extent of the passage, I think every invention for facilitating the discrimination of the two kinds of cases, ought to meet the encouragement of liberal surgeons. Actuated by this sentiment, I feel much pleasure in noticing Mr. Charles Bell's proposal, to use a particular sort of probe for ascertaining the extent of strictures. "I procured (says this gentleman) a series of silver and gold probes,* with circular knobs; the knobs varying from the full size of the urethra to what will just pass the narrowest stricture. By successively introducing smaller balls, I ascertain the degree of stricture by the ball which passes easily, and I am secure of being in the passage, by passing the probe onward, when it has got beyond the stricture. Then by the slight feeling of resistance in passing the ball, and in withdrawing it again through the obstruction, I ascertain the extent of the contraction. If the ball of this probe be liable, like the point of the bougie, to enter one of the lacunæ, or on passing it to rub upon its edge, yet by feeling whether the same roughness or difficulty attends the withdrawing of the bulb of the probe, as when it passed downward, we may be assured, whether there be a stricture of the canal, or whether the obstruction be not caused merely by the lacuna."† The author proceeds to observe, that, as the lacuna opens towards the urethra, its edge cannot catch the probe, while this instrument is being withdrawn, at which period a uniform smoothness must be felt, unless there be disease. When there is an irregular hardening of the urethra, for a considerable extent, the probe moves along it with difficulty; but, no sooner has it passed the obstruction, than it moves on with freedom.*

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* Plate VIII. fig. 2 and 3.

† System of Operative Surgery, vol. 1, p. 104.

Certainly, these balls seem well calculated for ascertaining the degree and extent of strictures, and, if found in practice to be productive of as much utility, as they seem to promise on paper, I have no doubt, that the cases proper for the armed bougie may hereafter be generally discriminated from others, which would receive most benefit from the common one.

It is obvious, that a caustic bougie is not at all proper for removing an obstruction of any extent. It could only act on the anterior part of the contraction, without presenting any prospect of being sufficiently efficacious to burn its way, by repeated applications, through the whole extent of the stricture. Even could we imagine, that it had this power, our judgment and common sense would revolt at the doctrine of this being the proper plan to be pursued. The common bougie, on the other hand, is introduced through the whole extent of the stricture, and acting like a wedge on every part of it, produces a general dilatation of the obstruction. When the stricture is conical, the common bougie must also merit a preference. However, in cases, in which no bougies can be introduced beyond the stricture, I am of opinion, that Mr. Home's plan of treatment is the best; the attempt to restore the pervious state of the urethra, in these instances, by the formation of successive eschars, must be attended with less irritation and pain, than any effort to get through the obstruction, by pressing the common bougie so forcibly against the stricture as to excite ulceration.

METHOD OF USING THE COMMON BOUGIE.

This instrument acts by producing a mechanical dilatation of the stricture. However, as it operates on living matter, it either makes the dilated part adapt itself to its new position, or recede by ulceration. If the case is one, that will allow even the smallest bougie to be introduced through the stricture, the cure may be considered as in our power. In many cases, in which the stricture is considerable, a great deal of trouble is given by occasional spasms, which either prevent the introduction of the bougies altogether, or only allow a very small one to pass. In such cases, Mr. Hunter was sometimes able to make the bougie pass, by rubbing the perineum with one hand, while he pushed forward the bougie with the other. He was also in the habit of frequently succeeding, by letting the bougie remain close to the stricture a little while, and then pushing it forward. The spasm has sometimes been removed by dipping the penis in cold water.

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* Plate VIII. fig. 3.

It is sometimes difficult to ascertain, whether a small bougie has passed through a stricture, or has only bent. In this case, a common-sized bougie should be previously introduced to learn the situation of the stricture, and afterwards, when the end of the small bougie is known to have reached the obstruction, the surgeon should push the instrument forward very gently, and for a short time. If the bougie enters the penis further, he may know whether it has entered the stricture, by removing the pressure from the bougie; for if this recoil, it has not passed, but only bent.

However, a very small bougie might be bent, and yet not recoil.

After the bougie has passed a little way through the stricture, and remained there a short time, we should withdraw it, and examine its extremity. If this should be flattened, grooved, or have its waxen coat pushed up for some extent, or if there should be a circular impression on the bougie, or only a dent on one side, made by the spasmodic action of the stricture, we may be sure, that it has passed, as far as those appearances and impressions extend.*

Now it becomes necessary to introduce another exactly of the same size, and let it remain as long as the patient experiences no particular inconvenience.

When the end of the first bougie is blunted, we may be sure, that it has not passed the stricture at all.

The best time for wearing bougies, is when the patient is in bed in the morning, or when he is not obliged to move about. The bougie should be gradually increased in size, as the stricture dilates, till the largest one can easily pass, and its use should be continued for three or four weeks afterwards, in order to habituate the parts to their new state.

One advantage, which common bougies have over caustic ones, consists in their being calculated, when introduced into the bladder, to operate on several strictures at once.

METHOD OF USING BOUGIES, ARMED WITH THE ARGENTUM NITRATUM.

The idea of applying caustic to strictures, through a cannula, was known to Wiseman. It appears, that Mr. Hunter, without having been aware, that the method had been noticed by the above writer, adopted the same plan in his own practice. The instruments, which he employed for applying the caustic, consisted of a silver cannula, and a stilet. One end of the stilet had a small bulb, which filled up the end of the cannula, and made it pass more easily down to the stricture. The other end was a portcrayon, that contained the piece of caustic which was introduced through the cannula, and applied to the stricture. The portcrayon, being guarded within the cannula, the whole was then withdrawn.

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* Treatise on the Venereal Disease, by J. Hunter, p. 117—120, edit. 2.

As Mr. Home remarks, this method was found in practice to be liable to many objections. The silver cannulæ could not be adapted to the flexible canal of the urethra. Hence, when the caustic was applied, and any degree of pressure employed, the effect of the caustic was necessarily produced upon the angle, between the stricture, and side of the urethra, and not upon the middle of the stricture, the part intended to be destroyed. Mr. Hunter not only saw the inconveniences of the cannula, but devised a more simple and commodious method of applying caustic accurately to the centre of the stricture.

Mr. Home explains the improved mode as follows: take a bougie, of a size that can be readily passed down to the stricture, and insert a small piece of lunar caustic into the end of it, exposing the surface of the caustic, but surrounding it everywhere laterally by the substance of the bougie. This should be done some little time before it is used; for, the materials, of which the bougie is composed, become warm and soft by being handled in inserting the caustic; and therefore the hold, which the bougie has of the caustic, is rendered more secure by the instrument being allowed to cool and become hardened.

This bougie is to be oiled; but, before passing it, a common bougie of the same size is to be introduced down to the stricture, in order to clear the canal, and to measure exactly the distance of the stricture from the external orifice. This distance being marked upon the armed bougie, the latter is to be passed down to the stricture, as soon as the common one is withdrawn. In its passage the caustic can scarcely come into contact with any part of the lining of the urethra, as the point of the bougie, of which the caustic forms the central part, always moves in the middle line of the canal; and, indeed, the quickness, with which it is conveyed to the stricture, would also prevent any injury of the membrane.

When the armed bougie is in contact with the stricture, it is to be steadily retained there, with a moderate degree of pressure at first, which is to be afterwards diminished, or else it would bend the bougie when this becomes softened by the warmth of the urethra. The time, which it is to remain, depends a good deal on the sensations of the patient, and the length of time the parts have been diseased; but, on the first trial, it should be less than a minute, as it then commonly gives greater pain, than at any subsequent application. Every other day appears, in general, to be as often as it is prudent to apply the caustic. Mr. Home, however has applied it every day in obstinate cases, and I have often done the same myself.

The bougie, introduced before the armed one, should be made of soft materials, that it may mould itself to the form of the passage, and communicate information, relative to the size, and position of the stricture.

Examples are occasionally met with in practice, where the application of armed bougies to strictures is followed by profuse bleeding. Perhaps, one of the most alarming hemorrhages, that ever took place from the urethra from such a cause, occurred in a patient of my own, whose case I have elsewhere related.*

METHOD OF USING BOUGIES, ARMED WITH THE KALI PURUM.

Mr. Whately considers strictures of the urethra not merely as contracted fibres, but as really diseased portions of the membrane lining that canal, with a continued disposition to increased contraction. Hence, he approves of a remedy, calculated both to remove the diseased affection, and to dilate the contracted part, without putting the patient to the inconvenience of wearing a bougie. Such a remedy he thinks caustic, when it is judiciously used. But, his great object is to recommend the employment of the kali purum in a particular manner, as being, according to his account, more efficacious, and less painful and hazardous, than bougies, armed with lunar caustic.

Before the kali purum ought to be used, the urethra should be rendered sufficiently capacious to admit a bougie, above the smallest size, into the bladder, and the strictures, if very irritable, should have this irritability previously lessened by the use of common bougies.

The bougie is armed with the kali purum as follows: put a small quantity of this caustic upon a piece of strong paper, and break it with a hammer into small pieces, about the size of large and small pins' heads. Thus broken, it should be kept for use in a phial, closed with a ground stopper. The bougie should have a proper degree of curvature given to it, by drawing it several times between the finger and thumb of the left hand, and it should be just large enough to enter the stricture with some degree of tightness. Then let it be passed gently into the urethra, and when its point stops at the stricture, which it almost always does, before it will enter it, make a notch with the finger nail, on the upper portion of the bougie, exactly half an inch from the extremity of the penis. When the bougie is withdrawn, a small hole, about the sixteenth part of an inch deep, should be made at the extremity of its rounded end. Some of the broken caustic should then be put upon a piece of paper, and a bit smaller, than the smallest pin's head, is to be selected for the first application. Let this be inserted into the hole of the bougie with a pocket knife, and pushed into it with the blunt end of a pin, so as to make the caustic situated rather below the margin of the hole. To prevent the kali from coming out, the hole should then be contracted a little with the finger, and the remaining vacancy in it filled with hog's lard. The bougie, being oiled, is to be passed with the curvature upward, to the anterior part of the stricture, the situation of which has been ascertained beforehand, and the bougie marked as already explained. The instrument should rest there for a few seconds, that the caustic may begin to dissolve. It should then be very gently pushed forward, about one eighth of an inch, when there should be another stop for a second, or two. The bougie should next be carried forward in the same gentle manner, till it has got through the stricture. After this, it should be immediately withdrawn, by a very gentle motion, to the part, at which it was first made to rest awhile. Then it should be very slowly passed through the stricture a second time; but, without letting the bougie stop in its passage. If pain, or faintness arise, the operation is now to end, and the bougie is to be immediately withdrawn; but, if no such effects should be produced, the instrument may be passed, and withdrawn, once or twice more, before concluding the operation, which will occupy about two minutes.

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* See Edinb. Med. and Surgical Journal, vol. 5, p. 333.

The application is to be repeated once, every seven days, and, if the stricture be found dilated, the bougie must be proportionally increased in size every time. The piece of caustic, in no cases, whatever, ought to be larger, than a common pin's head.

By the above procedure, Mr. Whately asserts, that the kali is equally diffused over every part of the strictured surface, and only *abrades* the membrane of the stricture, without producing a slough.

Whoever wishes further information, concerning this method of treatment, must consult Mr. Whateley's publication. cases, in which the stricture occupies some extent, I should fer common bougies; and, when the contraction is such, as would arise from tying a piece of packthread round the urethra, I should always prefer the bougies, employed in Mr. Home's method.

OF A NEW PASSAGE.

Mr. Hunter accurately informs us, that the greatest evil arising from the improper use of the bougie, and the most dangerous, is the formation of a new passage. This is generally occasioned by an attempt to excite ulceration by the application of the end of the bougie to the stricture, when this instrument cannot be passed through it. Every time a bougie is now introduced, it cannot be prevented from going into the new passage, and thus it is completely hindered from acting on the stricture.

In this circumstance, Mr. Hunter recommends the following operation. Pass a staff, or any such instrument, into the urethra, as far as it will go, which will probably be to the bottom of the new passage, and this, we may be certain, is beyond the stricture. Feel for the end of the instrument externally, and cut upon it, making the wound about an inch long, if the disease be before the scrotum; and an inch and a half, or more, if in the perineum. If the new passage be between the urethra and body of the penis, you will most probably get into the sound urethra, before you come to the instrument, or new passage. If so, introduce a probe into the urethra, through the wound, and pass it towards the glans penis, or, in other words, towards the stricture. When it meets with an obstruction, this must be the stricture, which is now to be got through, and afterwards dilated. To complete the operation, withdraw the probe, and, instead of it, introduce a hollow cannula forwards to the stricture. Then introduce another cannula from the glans downwards, till the two tubes are opposite each other, having the stricture between them. An assistant is now to take hold of the urethra on the outside, with his finger and thumb, just where the two cannulæ meet, in order to keep them in their places. Through the upper cannula next introduce a piercing instrument, which is to perforate the stricture, and enter the lower cannula. The piercing instrument is now to be withdrawn, and a bougie introduced through the first cannula and stricture, into the second cannula. The tubes are to be withdrawn, and the end of the bougie, in the wound, directed into

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* An Improved Method of Treating Strictures in the Urethra.

the bladder, through the further portion of the urethra. It may also be necessary to lay the whole of the false passage open in order to make it heal, for, otherwise, it might still obstruct the future passage of bougies into the proper canal.

If the new passage be between the skin and urethra, the surgeon must extend his incision more deeply, for the purpose of finding out the natural passage. Then he is to proceed as above explained.*

The longer the first bougie is allowed to remain in the canal, the more readily will the second pass. The bougies must be gradually increased in size, and used till the wound is healed. The only improvement, which seems proper to be made in this plan, is, to employ hollow bougies, or flexible gum catheters, which might be worn longer, than common bougies, as the patient could void his urine through them.

CHAP. LVIII.

FISTULÆ IN PERINEO, AND EXTRAVASATIONS OF URINE.

WHEN the urethra is very much obstructed, nature often endeavours to procure relief by ulceration on the inside of that part of the urethra, which is within the stricture. Hence, the urine insinuates itself into the loose cellular membrane of the scrotum and penis. The extravasation of this fluid becomes the cause of suppuration, wherever it is diffused, and even of mortification,† first of all the cellular substance, and then of several portions of the skin. If the patient survives, all these sloughs are detached, leaving a free communication between the urethra and external surface. Every opening, thus produced, is termed a *fistula in perineo.*

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* See Treatise on the Venereal Disease by J. Hunter, p. 137, &c. edit. 2.

† "Il n'est point de fluide dans l'economie animale, dont l'epanchement soit aussi funeste que celui des urines. Si on n'en procure promptement l'évacuation, elles excitent bientôt une suppuration putride dans le tissu cellulaire qui le contient, et le font tomber en pourriture, attirent sur la peau une inflammation gangréneuse, frappent enfin presque toujours de mort les parties qu'elles abreuvent." Œuvres Chirurg. de Desault par Bichat, tom. 3, p. 280, edit. 1803.

Sometimes the urine finds its way into the corpus spongiosum urethræ, becomes diffused through the whole of this texture, even injected into the glans penis, and occasions mortification of the parts, in which it is lodged.

In particular instances, however, where the urine is extravasated, the fluid does not spread thus extensively; but, on the contrary, is confined in a sort of pouch, its diffusion being prevented by the adhesive inflammation; and, on other occasions, instead of insinuating itself extensively into the cellular membrane, it is not only circumscribed, but presents itself in a purulent form, having excited inflammation and suppuration in the part. These circumscribed partial effusions of urine are never seen, except in cases, where the urethra is either not obstructed at all, or only imperfectly so; for, when the stricture is complete, and no urine whatever can pass, if the urethra ulcerates, the contents of the bladder always flow so suddenly and copiously into the cellular membrane, that the extravasation immediately occupies a considerable extent. It is clear, also, that, while no outlet for the urine exists, the effusion must continue to spread more and more.

TREATMENT.

When the effused urine forms only a circumscribed tumor, an incision may be made into the swelling, and an elastic gum catheter be introduced and worn. When the effusion is extensive, and strictures are the cause, a complete cure cannot be accomplished, without removing them. But, in general, this indication cannot be fulfilled in time to prevent all the mischief, arising from the extravasation of urine. An attempt indeed should be made to pass a bougie; for, sometimes, the stricture is, more or less, removed by the ulceration. When this is the case, Mr. Hunter advises the almost constant use of bougies, in order to procure a passage onward into the bladder. However, if it were possible, in this state of things, to introduce a bougie through the whole course of the urethra, there can be little doubt, that the most advantageous plan would be that of making the patient keep an elastic gum catheter continually in the passage. This instrument would at once conduct the urine outward, hinder any more from being effused, and act, like a bougie, on the remains of the stricture.

While measures are taken for curing the stricture, every thing, calculated to diminish inflammation, is to be put into practice. Scarifications to let out the urine, emollient poultices, and fomentations, bleeding, and exposing the parts to the steam of hot water, are particularly proper. Opium, given by the mouth, and in clysters, and the employment of the warm bath, are the best means of lessening any spasmodic affection. Too frequently, however, no bougie, nor elastic gum catheter, can be introduced; the evils, arising from the effusion of urine, are pressing; and no immediate hopes of overcoming the obstruction can be reasonably entertained. In this sort of case, we are advised by Mr. Hunter to endeavour to unload the bladder, and prevent the further effusion of urine into the cellular substance, by making an opening into the urethra, somewhere beyond the stricture; but, the nearer to it, the better.

Introduce a director, or staff, into the urethra, as far as the stricture. Cut down on the extremity of the instrument, and extend the incision a little farther towards the anus, so as to open the urethra beyond the stricture.*

When the stricture is opposite the scrotum, Mr. Hunter recommends making an opening into the urethra in the perineum; but, here, we cannot have the end of the staff to guide us, and we must trust to our anatomical knowledge. The rest of the operation resembles that for the cure of a false passage. A flexible gum catheter should then be introduced, and the wound healed.

Great attention should still be paid to the inflammation, produced by the diffusion of the urine. Scarifications ought to be made, in order to give vent to this fluid as well as the purulent matter. When there are sloughs, the surgeon would of course prefer puncturing dead, rather than living matter. But, this consideration must not lead him to omit making the scarifications in the most depending situations.

Practitioners, unaccustomed to see the consequences of urinary extravasations, would be alarmed at the magnitude of the ulcer, which is occasionally left after the detachment of the sloughs. Sometimes, the whole scrotum, and the integuments of the penis, groins, perineum, and upper part of the thighs, are attacked with mortification, and the naked testicles are seen in the middle of the enormous sore, suspended by the spermatic cords. It is hardly conceivable, how cicatrization can take place over the testicles, thus denuded; but, the resources of nature are found to be infinite. She causes the testicles and spermatic cords to unite to the subjacent parts, and, by drawing the skin from the circumference towards the centre of the sore, she covers those organs, and forms for them a new investment, like a scrotum. This statement, says Bichat, is founded on a vast number of cases, in which nature was seen to pursue this course. The healing of the ulcer, indeed, is far quicker, than might be expected, considering its great extent. Now, in all this salutary change, what does art effect? If, observes, Bichat, we except the introduction of the catheter, which is absolutely necessary for a complete cure, surgery can afford the majority of patients little, or no useful aid; for, when they are not debilitated by the long existence of the malady, and are of good constitutions, and in the vigour of life, they recover, with as much expedition and certainty, with the aid of a proper regimen and simple dressings, as if internal medicines, and a farrago of topical applications were employed. In short, adds Bichat, the practice at the Hôtel Dieu consists in applying emollient poultices, until all the sloughs have separated. The ulcer is then sometimes dressed with pledgets charged with storax, though frequently with nothing but dry lint, which is continued to the end of the treatment. When any complication occurs in the course of the case, an endeavour is made to remove it by such means, as are suited to the indication, which it presents. Thus, when prostration of strength prevails, bark, and cordials are exhibited. But, in every instance, the elastic gum catheter is to be regarded, as the essential means of cure: without this instrument, the recovery is almost always imperfect, and the sore leaves behind several urinary fistulæ.*

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* Treatise on the Venereal Disease, p. 146, edit. 2.

In old cases of fistulæ in perineo, where the dangers, arising from the diffusion of urine, are past, the surgeon is to endeavour to make the natural passage as free as possible by the use of the common, or caustic bougies; for, frequently, the fistulous openings in the perineum heal up spontaneously, as soon as the urine finds a free passage forward through the urethra.

When the fistulæ in perineo do not heal, on the complete removal of the stricture, they are to be laid open, in the same manner, as other sinuses, which have no disposition to heal. In doing this, as little as possible of the sound part of the urethra must be opened. Hence, the surgeon must direct himself to the inner orifice of the fistulæ, by means of a staff introduced if possible into the bladder, and a probe passed into one of the fistulous passages. Here it is essential to remark, that however numerous the external openings may be, fistulæ in perineo never have more than one internal opening, by which they communicate with the urethra. The probe should be first bent, that it may more readily follow the turns of the fistula. When it can be made to meet the staff, so much the better; for, then the operator can cut just what is necessary.

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* Œuvres Chir. de Desault par Bichat, tom. 3, p. 286, 287.

When the fistula is so straight as to allow a director to be introduced, this instrument is the best. If, as Mr. Hunter observes, neither the probe, nor the director can be made to pass as far as the staff, we must open as far as the first instrument goes, and then search for the continuation of the passage, for the purpose of opening it.

Certainly, there may be cases of fistulæ in perineo, attended with most unyielding strictures; in which instances, it might be proper to cut through these obstructions, in the way recommended for the cure of a false passage. But, undoubtedly, we ought always to try the efficacy of bougies, before having recourse to such an operation.

Having divided the fistulæ, as far as their termination in the urethra, a flexible gum catheter should be introduced, and worn at first almost constantly. When the sores become stationary, however, it is better to withdraw the catheter, and, only introduce it occasionally; for, its continual presence sometimes prevents cicatrization.

The dressings are, at first, to be introduced down to the bottom of the wounds, for the purpose of preventing the union of the parts, which have been just divided, and (to use Mr. Hunter's words) in order to make the granulations shoot from the bottom, so as to consolidate the whole by one bond of union.

CHAP. LIX.

RETENTION OF URINE

SIGNIFIES that disorder, in which the urine cannot be expelled from the bladder. The disease has been described by the ancients, under the generic name of ischuria. Some writers have discriminated it from dysury and strangury, which are represented as particular cases; while others have considered these last only as different kinds of retention of urine. *Dysury* is applied to that, in which the urine can only be discharged with pain and difficulty; *strangury* expresses that, in which the evacuation can only be made by drops; and *ischuria* denotes that, in which no urine at all can be voided. Desault imputed this variety in the symptoms to different degrees of the same disease, and, therefore, he preferred the division into the complete and incomplete retentions.

When the evacuation of urine from the bladder is prevented by any particular cause, this viscus generally becomes distended in a very remarkable degree. In an infant, eighteen months old, it has been found to contain a pint of fluid; and, in adults, six or seven pints. It has been known to occupy not only the whole cavity of the pelvis, but, also, to ascend into the abdomen, higher than the umbilicus. Nay, it has sometimes been elongated through the abdominal ring, or under the crural arch, so as to form an inguinal, or femoral hernia. Such elongations, indeed, are not common; but, yet, many are upon record.* In ordinary cases, the bladder preserves nearly its natural figure. Its dimensions, however, are not all equally increased. It yields from below upwards, more than in any other direction. The lower part of this viscus becomes broader and more deeply situated, depressing the perineum; in women, pushing the vagina backward; and, in men, the rectum; and occasioning in these passages, a tumor, which more or less fills up their cavity, and which, in the intestine, may actually obstruct the evacuation of the feces. The posterior parietes of the bladder, covered by the peritoneum, push upward and backward the small intestines, and rise into the abdominal cavity. The fundus, in tending above the pubes, glides, as it were, betwixt the peritoneum, which it raises, and the abdominal muscles. The anterior and superior part, which forms a swelling in the hypogastric region, is, in fact, in contact with the recti and transversales muscles. This circumstance ought to be understood, because it shews, how the bladder may be opened, without any danger of wounding the peritoneum, and causing an extravasation of urine. It is by no means uncommon to observe between the fleshy fasciculi of bladders, which have been much distended, pouches, or cells, in which calculi are often lodged. When the urine has dilated the bladder to the utmost, without the obstacle to its natural escape through the urethra being removed, it next accumulates in the ureter, which, with the pelvis of the kidney, becomes enormously distended. The valvular contrivance, by which the ureter terminates in the bladder, now disappears, and the opening sometimes becomes nearly an inch in diameter. At length, there being actually no receptacle for more urine, the secretion is suppressed.

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* See Récherches sur la Hernie de la Vessie, par M. Verdier; in Mém. de l'Acad. de Chirurgie, tom. 2, 4to.

The diagnosis of the present disease is not attended with much difficulty. The rational symptoms, indeed, though numerous, are mostly equivocal; as, for instance, no urine having been voided for one or several days; its discharge by drops, or in small quantities at a time; a continual desire to make water; such efforts as precede the exercise of this function; the inclination still felt to empty the bladder, though the patient may just have voided as much urine, as he ordinarily does; a diminution of the force, and stream of the fluid; a sensation of weight about the perineum; tenesmus; constipation; and hemorrhoids. To these ambiguous symptoms are to be added; acute pain in the hypogastric region, extending, along the urethra, to the glans penis, and, after a time, to the region of the kidneys; and pain, that is increased, when the patient walks, coughs, or holds an upright posture, and that is diminished, by his inclining himself forward, so as to relax the abdominal muscles. Lastly, among the doubtful symptoms, are to be enumerated, fever, nausea, difficult breathing, sweats with an urinary and ammoniacal smell, hiccough, vomiting, pain and tension of the belly, coma, convulsions, delirium, &c.

Notwithstanding the great number of the above symptoms, they afford no certainty, with regard to the existence of a retention of urine, and the surgeon can only derive positive information from the swellings, formed by the distended bladder, above the pubes, and in the rectum, or vagina.

The tumor above the pubes varies much in its dimensions. Sometimes, it rises higher, than the umbilicus. It it circumscribed, without alteration of the colour of the skin, and without any hardness at its circumference. It is broader below, than above; elastic; and not particularly painful, when touched, unless forcibly pressed; and then the desire to make water is increased, or some drops of urine even make their escape from the urethra.

The tumor in the rectum, or vagina may be plainly felt. It only occupies their anterior parietes. It is th roughout its extent elastic, even, and without any particular induration. But, a symptom, that highly merits the notice of the practitioner, is the fluctuation, or rather undulation, which is perceptible on touching, at the same time, the swelling above the pubes, and that in the rectum, or vagina.

Every surgeon should be apprised, however, that these swellings are not constantly perceptible: complete retentions have been noticed, where in consequence of the unyielding state of the bladder, this organ only contained a few spoonfuls of urine.*

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* Œuvres Chir. de Desault, par Bichat, tom. 3, p. 112—116.

A retention of urine is always an alarming disease, and, when complete, demands prompt succour. If relief be too long delayed, the consequences are most distressing; for, the bladder, when long distended, loses its contractile power, which is slowly recovered, and, what is still worse, it generally inflames, sloughs at some point, or another, and its irritating contents become extravasated.

However, when relief is not afforded, the progress of the disease varies, according to circumstances. 1. When the bladder has been distended to a certain pitch, and the cause of the retention of urine is not such, as to close the urethra, the contents of the bladder, at length, begin to be discharged by drops. This viscus, however, is not emptied by the occurrence: the same degree of distention and fulness continue, though they do not augment. It is this sort of retention of urine, which may last several weeks, without producing further dangerous consequences. 2. When the disorder is owing to a total closure of the canal, through which the urine is naturally evacuated, the distention and fulness of the bladder continually increase, until at last, inflammation, sloughing, and even death, take place. Sometimes, however, and, probably, when the slough is, as it were, only a speck, the bladder bursts at the affected point, the urine becomes diffused in the surrounding parts, and the patient becomes suddenly freed from the preternatural distention of the bladder. The result depends on the situation of the slough of this viscus. For the most part, the breach is formed in the vicinity of the neck of the bladder, so that the urine is extravasated in the cellular membrane of the perineum and scrotum, and fistulæ in perineo take place.* Sometimes the slough opens a passage for the urine into the rectum, and this fluid is suddenly discharged with the stools. The bladder occasionally bursts at its superior and anterior part, and the urine becomes diffused in the cellular substance of the abdominal muscles. When the fundus of this viscus bursts, its contents may be effused into the cavity of the abdomen, and the consequences be fatal. Sometimes, the urine is discharged at the navel. In this instance, a preternatural pouch forms, which occasions a fluctuating tumor at the umbilicus, and, at last, the swelling inflames and bursts. This occurrence is commonly seen in children.† The bladder is seldom found ruptured, unless a slough has previously occurred.

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* In the urethra, ulceration occurs, as we have described in the chapter on *fistulæ in perineo.*

† One such case I have seen myself.

In every retention of urine, two chief indications present themselves. The first is to procure, by some means or another, a timely evacuation of that fluid, in order to prevent the serious consequences already specified. The second is to obviate the causes, which hinder its expulsion from the bladder.

In this work, I can only consider the disorder, as arising from four principal causes; namely; 1. weakness, or paralysis of the bladder; 2. inflammation of this viscus, or of the adjacent parts; 3. a spasmodic closure of the neck of the bladder, or urethra; 4. and lastly, some obstruction in the passage.

RETENTION OF URINE FROM PARALYSIS OF THE BLADDER.

In this case, the passage for the urine is open; but, the bladder has not the power of contraction. The nature of the disorder is distinguished by the foregoing cause, and by the facility, with which the catheter may be introduced.

In persons of advanced age, the bladder becomes less sensible to the stimulus of the urine, and loses the power of contracting sufficiently to expel the whole of its contents. This is the first degree of the retention of urine, which is common to old subjects, and originates in a very gradual manner. The urine flows in a full, but a weak stream, and towards the end of every evacuation, the water only comes away by drops. The quantity of urine, expelled at a time, becomes by degrees smaller and smaller, until a perfect retention occurs.

This species of the disorder is often imputable to a pernicious habit of not taking a sufficient time to discharge the whole of the urine. Sometimes, it is owing to an injury done to the loins, and it is then usually attended with a paralytic affection of the lower extremities. Most frequently, it is produced by an unusual distention of the above viscus, whereby this is deprived of the power of contracting itself again. The distention occurs, either in consequence of retaining the urine too long, after an inclination to void it is first felt; or in consequence of another species of retention, which has only attained a certain degree.

The paralytic retention of urine is not so dangerous as the other kinds, especially those, which are produced by a closure of the urinary passage. Inflammation and sloughing of the bladder seldom result from it. As the urethra is pervious, no sooner is the bladder distended in a certain degree, than the pressure of the abdominal muscles causes a partial discharge of its contents. The nature of this case is very liable to be misunderstood, on account of the urine dribbling away, and as much being evacuated in the course of the day, as usual; and, also, in consequence of the patient himself being able by an effort of the abdominal muscles, and pressing the lower part of the belly, to make the urine flow out in a stream.

The disease, in fact, is exceedingly apt to be mistaken by the inexperienced for one of a totally different description, namely, an incontinence of urine.

There are two indications, in the treatment of this kind of retention of urine; the first is to draw off the fluid distending the bladder; the second is to restore the natural contractile power of this viscus, in accomplishing which latter object, it is necessary to pay attention to the cause of the malady.

The catheter is the most certain means of drawing off the water, and its introduction should never be imprudently delayed, when the complaint has been of any duration; for, the distention of the bladder, and the loss of its contractile power, are continually increasing, and, of course, a radical cure is rendered more and more difficult. It is only in very recent cases, that it is proper to be content with trying at first such remedies, as seem calculated to re-establish the contractile power of the bladder. With this latter view, fifteen or twenty drops of the tinct. canthar. may be taken once a day; a blister may be applied to the sacrum, or perineum; and cold lotions to the hypogastric region.

If success should not speedily attend this treatment, the bladder is to be emptied by means of the catheter. When, however, the contractile power of the viscus is totally lost, the whole of the urine does not flow out, even through this instrument, particularly, if the patient should be lying upon his back. In this case, the evacuation must be assisted by pressing the lower part of the abdomen, and making the patient stand up.

The second indication is to restore the contractile power of the bladder; for, as long as this faculty remains unrecovered, the distention and fulness of the viscus recur, and exasperate the malady. Hence, any large quantity of urine must be prevented from accumulating, by the continued employment of the catheter. This must be introduced several times in the course of twenty-four hours. When the patient, on account of his remoteness, cannot be visited repeatedly, it is better to leave the catheter constantly in the urethra. In such cases, a flexible catheter, made of elastic gum, should always be employed, in preference to a silver one.

When the catheter is to be left in the passage, it is found most advantageous not to let the urine continually dribble away, through the instrument. The writings of Desault inform us, that the bladder is longer in recovering its tone, when constantly relaxed, than when it is allowed to be now flaccid, and now moderately filled with urine.* Hence, it is better either to stop the opening of the catheter, and only allow the urine to be evacuated every two or three hours, or else take the tube out altogether, and introduce it merely when the urine is to be discharged. If the instrument is to remain any length of time in the passage it must be withdrawn, and cleansed, about once every six or eight days. As these cases are often tediously long, it is very useful to teach the patient himself to introduce the catheter.

Together with the continued use of this instrument, the above means, calculated to restore the contractile power of the bladder, ought to be employed.

The occasional causes are, also, to be considered. When the loins are injured, topical bleeding, the saturnine lotion, the volatile liniment, blisters, and electricity, are of service. Retention of urine is, in fact, very often merely a symptom of another disease, and then the removal of the latter generally leads to a cure.

When the bladder can completely empty itself, the catheter is no longer necessary. But, the surgeon must assure himself by an introduction of the instrument, that this is really the case; for, if any of the urine should be allowed to remain undischarged after each evacuation, the quantity would gradually increase, and a complete retention take place again.

CATHETER.

Some of these are inflexible; while others are flexible, and elastic. The common inflexible catheter is a silver tube of such a diameter, as will allow it to be introduced with facility into the urethra, and of various figure and length, according as it is intended for the male, or female subject. A common male catheter is ten or eleven inches long. In general, when the urethra is free from obstruction, a large instrument of this kind, like a large bougie, will enter the bladder with more ease, than a smaller one, because less likely to be entangled in the lacunæ of the passage. One third of the catheter, towards its point, should be moderately bent, the curvature being the segment of a circle that is about six inches in diameter; the other two thirds, towards its handle, should be straight. The instrument, when gently curved, is found to be more easily introduced, than when it is very much bent. The female catheter is straight, excepting a slight curvature towards its point, and it is about six inches in length.

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* "Ces alternatives d'extension médiocre et de relâchment, font sur ce viscère, ce que fait l'exercice modéré sur les autres parties du corps." Œuvres Chir. de Desault, par Bichat, tom. 3, p. 126.

The ordinary flexible catheter is nothing more, than a hollow bougie; and the elastic one, which was invented by M. Bernard, contains in its composition elastic gum. The two last descriptions of catheters have the advantage of being less irritating to the urethra, and less apt to become covered with calculus incrustations, than silver tubes. They can also be introduced, in cases of obstructions in the urethra, when an inflexible silver catheter cannot be passed.

Sometimes, the instrument is difficult of introduction, owing to a spasmodic affection of the urethra, and neck of the bladder. In this case, a dose of opium should be administered, before a second attempt is made. When inflammation is present, the introduction may often be facilitated by a previous bleeding.

The operation of introducing the catheter may be performed, when the patient is either standing up, sitting, or lying down; but that posture, in which the patient reclines back on a couch or bed, is reckoned the most advantageous.

In performing it, one of the most important maxims is never to force forward the instrument, when it is stopped by any obstacle. If there are no strictures, the stoppage of the catheter is always owing to one of the following circumstances. Its beak may be pushed against the os pubis. This chiefly occurs, when the handle of the instrument is prematurely depressed. Here the employment of force can obviously do no good, and may be the cause of serious mischief. The beak of the catheter may take a wrong direction, and push against the side of the urethra, especially at its membranous part, which it may dilate into a kind of pouch. In this circumstance, if force were exerted, it would certainly lacerate the urethra, and occasion a false passage. The end of the catheter may be entangled in a fold of the lining of the urethra; and here force would be equally wrong. Lastly, the point of the instrument may be stopped by the prostate gland, in which event force can be of no service, and may be productive of great harm. Hence, it is always proper to withdraw the instrument a little, and to push it gently onward in a different position.

As Richter states,* the operation may be divided into three stages: in the first, the catheter passes, in the male subject, that portion of the urethra, which is surrounded by the corpus spongiosum; in the second, it passes the membranous part of the canal, situated between the bulb, and the prostate gland; in the third, it enters this gland, and the neck of the bladder. In the first stage, little trouble is usually experienced; for, the canal is here so supported by the surrounding corpus spongiosum, that it cannot easily be pushed into the form of a pouch, in which the end of the instrument can be entangled. The operator need only observe the following circumstance. The penis should be held, by placing the corona glandis between the thumb and the index finger of the left hand: in this way, the entrance of the urethra will not be at all compressed. The penis is then to be drawn upward, with moderate force. The catheter, being well oiled, is now to be introduced, with its concavity towards the abdomen, into the urethra, directly downward, until its point reaches the bulb. As soon as this occurs, and the beak of the instrument has passed under the arch of the pubes, the surgeon must very slowly bring the handle of the catheter forwards, between the patient's thighs, and in proportion as this is accomplished, the beak of the instrument becomes elevated, and glides into the bladder. In this stage of the operation, the penis must be allowed to sink down, and not be kept tense, as this would only drag the membranous part of the urethra against the os pubis, and render the passage of the instrument more difficult. The operation, however, is not always successfully accomplished in this manner. The beak of the catheter may be stopped by the os pubis; it may take a wrong direction, so as to push the membranous part of the urethra to one side or the other; or it may be stopped by a fold of the lining of the passage. The first kind of impediment is best avoided by not depressing the handle of the catheter too soon; that is, before the point has passed beyond the arch of the pubes.

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* Richter's Anfansgr. der Wundarzneykunst, band 6, p. 232, 233, edit. 1802.

When the membranous part of the urethra is pushed to one side, or the other, the instrument ought to be withdrawn a little, and then pushed gently on in a different direction. When this expedient is unavailing, the index finger of the left hand may be introduced into the rectum, for the purpose of supporting the membranous part of the urethra, and guiding the extremity of the catheter.

When the prostate gland is enlarged, the diameter of the urethra does not undergo any diminution; but, it turns upward very suddenly, just before its approach to the bladder. In such cases, the end of the catheter should be more bent upward, than the rest of its curvature. Mr. Hey has found, that, in withdrawing the stilet of an elastic gum catheter, the instrument becomes more curved; and he has availed himself of this information, by withdrawing the stilet, as he is introducing the catheter beyond the arch of the pubes, by which artifice, the point of the instrument is elevated in the due direction. This gentleman is in the habit of employing stilets made of brass wire, about one tenth of an inch in thickness.*

When such experiments fail, the surgeon should try catheters of various sizes, and curvatures.

In the third stage of the operation, the beak of the instrument has to pass the prostate gland, and neck of the bladder. The chief impediments to its passage in this situation arise from a spasmodic contraction of the neck of the bladder, and from the instrument being pushed against the prostate gland. The first obstacle may be generally obviated by waiting a few moments, and gently rubbing the perineum, before pushing onward the catheter. The impediment, caused by the prostate, is best eluded, by using an instrument, the point of which is more curved, than its other part. Sometimes the surgeon himself presses the prostate towards the os pubis, by means of the finger in the rectum, and thus prevents the passage of the catheter, by increasing the sudden curvature at this part of the urethra. Hence, as Richter observes, it is a very important maxim, never to introduce the finger so far into the rectum, as to press on the prostate gland itself.†

Many eminent surgeons prefer introducing the catheter, as far as the perineum, with its convexity towards the abdomen; then keeping the point stationary, they make the handle describe a semicircular movement downwards, so as to bring the concavity of the instrument towards the pubes, as it is situated in the above method. This is the plan, which the French surgeons call "le tour de maître."

Flexible and elastic catheters may be introduced, either with, or without, a stilet. These have the same curvature as the silver catheter. When there is difficulty in introducing an elastic catheter with a stilet, the latter may be withdrawn, about an inch, in order to allow the end of the instrument to become more curved.

INFLAMMATORY AND SPASMODIC RETENTION OF URINE.

Inflammation, occasioning this complaint, is frequently situated in the neck of the bladder, urethra, or adjacent parts. The difficulty of voiding the urine is rather to be attributed to the spasmodic affection of the urinary passage, than to the swelling produced by the inflammation. The complaint must obviously originate in this way, when the inflammation is not situated in the urethra, and neck of the bladder, but in some neighbouring part. Hence, the antiphlogistic treatment, and antispasmodic remedies, are both indicated. It is commonly believed, that a mere inflammation of the neck of the bladder may occasion retention of urine; but, as Desault and Richter have remarked, the complaint is, most probably, generally owing to inflammation in the vicinity; for, inflamed muscles are not prone to contract. In examining the bodies of those subjects, who die of enteritis, we find the intestines preternaturally distended, not contracted.*

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* Practical Observations in Surgery, p. 397, 398, edit. 2.

† Anfangsgr. der Wundarzneykunst, band 6, p. 240.

The inflammation, causing retention of urine, may arise from various circumstances. Violent fits of the stone; very bad piles; the use of stimulating diuretic medicines, especially the tinct. canth.; the absorption of cantharides from blisters; bruises of the perineum; fistulæ in ano, &c. may be productive of such irritation in the urinary passages, as shall occasion them to become spasmodically affected. But, the most frequent exciting cause of the spasmodic, or inflammatory, retention of urine, is the irritation produced by strictures, and virulent gonorrhœas. From this account, it is manifest, that besides taking care to employ antiphlogistic and antispasmodic remedies, it is also necessary to pay attention to each particular cause of the irritation.

The most potent means for relieving the retention of urine, now under consideration, are, copious venesections; the application of leeches to the perineum, or vicinity of the os pubis; the exhibition of opium by the mouth, and in clysters; the warm bath; and fomentations to the hypogastric region, and perineum. Some also recommend rubbing the latter part with an embrocation, composed of hartshorn, camphor, and tinct. opii.

When these measures have been fairly tried, without success, the catheter is to be used without delay. The continued lodgment of the urine, and the distention, arising from its quantity, may soon cause the paralytic affection of the bladder, already noticed, and even occasion, in the course of three or four days, sloughing, and a fatal extravasation of the urine. When no kind of catheter can be introduced, not even a small one made of elastic gum, and the other remedies are unavailing, it becomes necessary to puncture the bladder, in the way, which we shall next describe.

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* "On ne voit jamais un muscle inflammé se contracter, et si on le force d'agir, il ne peut exécuter que de foibles mouvemens. Nous avons aussi remarqué constamment avec ceux, qui ont ouvert des cadavres, que dans les inflammations de bas-ventre, les intestins phlogosés étoient distendus, au lieu d'être rétrécis et resserrés sur eux-mêmes." Œuvres Chirurg. de Desault, par Bichat, tom. 3, p. 147, 148.

CHAP. LX.

PUNCTURING THE BLADDER.

THIS operation ought not to be considered a very dangerous one. It is probable, that, when death follows, it is generally owing to the puncture not having been made sufficiently soon. We can hardly suppose, that a small wound, made in such parts, as are divided in the operation, can often occasion the fatal termination of these cases. Hence, I think, there can exist no rational doubt, that, when such means, as seem best calculated for promoting the discharge of urine, have failed, after having had a fair trial, the operation of puncturing the bladder becomes immediately as much indicated, as the division of the stricture in cases of strangulated herniæ, when other means have not been productive of the object in view.

Mr. Charles Bell states, that the fifth, sixth, and seventh days, from the commencement of the total obstruction, are those, on which the urine may escape from the bladder into the abdomen; and, consequently, he recommends the operation to be performed on the fourth day.*

However, although I am an advocate for not delaying the puncture, after milder methods have decidedly failed, I believe that these methods will almost always prove successful under skilful hands, and that the operation may generally be avoided. In the opinion of Desault, there are very few instances, in which a surgeon, expert at introducing the catheter, cannot introduce the instrument into the bladder, and, consequently, the cases, in which paracentesis is absolutely necessary, must be exceedingly unfrequent. This assertion, says Bichat, might be confirmed by a multitude of cases. During ten years, while Desault was principal surgeon of the Hôtel-Dieu, at Paris, where diseases of the urinary passages, and, more especially, obstructions in the urethra, are constantly numerous, this distinguished practitioner never had occasion to puncture the bladder, except in one example. This case happened soon after his appointment to the hospital, and, he declared subsequently, that if he had then had as much experience, and had possessed as much skill in introducing the catheter, as he had afterwards acquired, he might, perhaps, have extricated this individual patient from the necessity of submitting to the operation. But, as Bichat observes, since it is not every practitioner that is skilful enough to make the catheter surmount the various obstacles, which may present themselves to its passage, without risk of making a false passage, or doing other considerable mischief; and, since the urethra may sometimes be totally obstructed, so that no catheter, nor bougie, though introduced as far as the stoppage, can serve to give exit to the urine; the operation, in these circumstances becomes positively indispensable, for the purpose of relieving the urgent symptoms arising from the retention, and preventing the bladder from bursting.*

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* Operative Surgery, vol. 1, p. 315.

There are three situations, in which surgeons may make an opening into the bladder, viz. from the perineum, above the os pubis, and through the rectum. Of the first operation, I shall say nothing; it is now almost exploded, and, I hope, will soon be entirely rejected from the practice of surgery.

OF THE PUNCTURE ABOVE THE PUBES.

Some writers have advised the surgeon to make a perpendicular incision, about two inches in length, through the integuments and fat, covering the lower part of the linea alba. When this plan is followed, the wound ought not to be made, as some authors direct, with its lowest part full an inch above the os pubis. There is no real reason for avoiding this bone, and, the lower the incision of the above extent is made, the nearer it is to that part of the bladder, which it is most adviable to puncture, and the further it is from the peritoneum. Hence, the bottom of the incision should just meet the upper part of the above bone. A cut of the same length is next to be made between the pyramidal muscles, and, this being done, the surgeon can feel with his finger the prominent, distended bladder. A trocar, the curvature of which forms a segment of a circle seven inches in diameter, is now to be introduced into the exposed part of this viscus. When this instrument is held with its convexity upward, that is, towards the patient's navel, it can be more conveniently introduced obliquely downward and backward into the bladder, in the direction of the axis of this receptacle, than any straight trocar can possibly be. As M. Sabatier observes, a curved instrument, of this kind, is much less likely to penetrate the back part of the bladder, and wound the rectum; besides, having this advantage, that, when the urine is evacuated, and the viscus collapsed, the cannula will not be so apt, as that of a straight trocar, to be separated from the part, in which it has been introduced.*

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* Œuvres Chirurg. de Desault par Bichat, tom. 3, p. 316.

However, there can be no doubt, that it is perfectly safe to introduce the trocar at once into the bladder, without any preparatory division of the skin and fat. The latter is the method, which I should always select myself.

When the operator perceives, by the want of resistance, that the point of the instrument is in the bladder, he is to take hold of the mouth of the cannula, and, while he pushes this further into the viscus, he is to withdraw the stilet. The cannula is to be allowed to remain in the wound, after the urine is evacuated. Its mouth is to be stopped with a linen tent, and it is to be kept from slipping out, by tapes, passed through the two little rings at the sides of the instrument.

Some surgeons are in the habit of passing an elastic gum catheter into the bladder through the cannula, and then taking the latter away. I cannot say, that I can perceive any utility, or advantage in this method. An elastic gum catheter does not fill the wound; consequently, the urine is discharged, not only through its cavity, but also between the track of the wound and the circumference of the instrument, so that the chance of the urine becoming diffused into the cellular membrane is not guarded against, as it is by allowing the cannula to remain in the wound, at least, two, or three days, until inflammation has agglutinated together the surrounding cellular substance, and removed the possibility of the urine becoming extravasated. It is now known, that, after the above period, the cannula may be safely and easily taken out, and introduced, as occasion may require.†

Another objection to introducing an elastic gum catheter, is the length of such an instrument, the end of which would produce great irritation in the bladder. The use of long, straight, silver cannulæ, has been known to form a communication, between the bladder and rectum, in consequence of ulceration, or sloughing, produced by the pressure of the points of these instruments on the back part of the bladder. Mr. Samuel Sharp mentions his having seen this accident.*

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* See De la Médécine Opératoire, tom. 2, p. 128, 129.

† See Bohn von dem Blasenstiche; Noel in Desault's Journal de Chirurgie, tom. 2; Turner, in London Med. Journal, vol. 11; Journal de Médécine, tom. 83.

However, it is obvious, that the exit, made for the urine, in the above operation, is merely designed as a temporary one, and that, as soon as the impediment to the passage of the water through the urethra is removed, the wound ought to be allowed to heal.

Whenever the prostate gland is known to be very much enlarged, one would certainly prefer this mode of operating to puncturing the bladder through the rectum. The wound is made at a place, where there is no risk of injuring any part of importance; but, in this method, little as the chance is of an extravasation of the urine taking place, it is certainly a possible event, and the opening is not made in a depending situation, so that the whole of the urine cannot be conveniently evacuated.

OF THE PUNCTURE THROUGH THE RECTUM.

The patient is to be put in the posture, which will be recommended for lithotomy. An assistant is to make pressure on the abdomen, just above the os pubis, in order to make the prominence of the bladder more distinct to the surgeon's finger in the rectum. A curved trocar,† with its point drawn within the cannula, is to be introduced with the right hand, and conveyed upon the index finger of the left, as high as the surgeon can reach up the intestine, along the swelling, formed by the distended bladder. The instrument should be kept exactly in the central line of the front portion of the rectum, and, when conveyed sufficiently beyond the prostate gland, the point of the trocar is to be pushed into the bladder, through the anterior part of the intestine.

This operation is so easy of accomplishment, and so very safe, that it certainly merits a general preference. The coats of the rectum and bladder, at this part, are in immediate contact, and the instrument has to penetrate no thickness of substance. The operation is not more painful, than venesection, and the distended bladder is so distinctly perceptible to the finger, that no mistake can well be made. The only chance of doing mischief arises from the situation of the vesiculæ seminales; but, all risk is removed, when the trocar and the finger are introduced very high into the rectum, and the puncture is made exactly in the central part of the swelling. Hence, the trocar, employed for this operation, ought to be somewhat longer, than an ordinary one.

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* See a Critical Inquiry into the Present State of Surgery, p. 127, edit. 4,

† See Plate 10, fig. 1, and 2.

The only inconvenience, following the operation, is the necessity of keeping the cannula introduced, through the rectum, until the urine resumes its natural course. This circumstance is not only very troublesome, when the patient walks or sits; but, is particularly so, at the time, when he goes to stool. The trouble, attendant on the evacuation of hardened feces, may always be diminished by injecting a clyster. Whenever the patient has a motion, he is under the necessity of holding the cannula with his fingers, in order to prevent its protrusion.

I am of opinion, that no harm would ever result from withdrawing the cannula, after puncturing the bladder through the rectum. If the urethra should not be pervious at the time, the frequent passage of urine through the wound, would certainly be sufficient to keep it from closing, and the occasional passage of urine through the lower part of the rectum, would not be so irritating and troublesome, as the continual presence of the cannula. There is upon record,* an instance, in which the cannula was inadvertently withdrawn, forty-eight hours after the operation, and could not be introduced again. The urine was discharged into the rectum, through the wound, for six days afterwards; and when it began to flow through the urethra, the wound healed, without leaving any fistulous communication between the bladder and the intestine. Richter states, that the cannula has even been withdrawn immediately after the operation, without any inconveniences following the occurrence.†

However, it is not my intention to advise the cannula to be withdrawn. This operation is not eligible, when the prostate gland is very much enlarged; when there are large hemorrhoids present; or when the rectum is, what is termed, scirrho-contracted.

To women it is obviously inapplicable, for anatomical reasons. In female patients, however, it is very practicable to puncture the bladder from the vagina. But, in these subjects, the urethra is so capacious and short, that the surgeon can hardly expect to be ever under the necessity of puncturing the bladder; the catheter may almost always be introduced. The female bladder might, and, indeed, has been punctured from the vagina. If necessary, the operation could also be done above the os pubis.*

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* Bently in Medical Communications, vol. 1.

† Richter's Anfansgrunde der Wundarzneykunst, band 6, p. 328, edit. 1802.

CHAP. LXI.

INCONTINENCE OF URINE.

AN inability to retain the urine in the bladder is of three kinds: in one, the water continually dribbles away, without any inclination to void it, or any sensation of its being voided. In other instances, the patient can hold his urine in a certain degree; but, the propensity to evacuate it comes on so frequently, suddenly, and irresistibly, that he is compelled to discharge it. The third kind of incontinence only occurs during night, when the patient is asleep.

The first species of incontinence of urine depends on a weakness, or total paralysis, of the sphincter muscle of the bladder. As the neck of this organ is constantly open, every drop of urine escapes into the urethra, immediately it has descended from the ureters, and does not lodge in the bladder at all. Sometimes the weakness, or paralysis, of the sphincter muscle is quite a local disorder; but, most frequently, it is only symptomatic of some other affection. In the first case, it is often the consequence of a difficult labour, in which the neck of the bladder has been a long while compressed; or of the distention, caused by a stone lodged at this part of the viscus. Sometimes, incontinence of urine depends on a malformation of the urinary passages, and exists from the time of birth. The complaint is often only an effect of apoplexy, injuries and diseases of the spine, &c.

It is not dangerous, though exceedingly annoying, in consequence of its continually wetting the clothes, causing a disagreeable smell, and even excoriating parts, over which the urine flows.

When the malady is local, tonics and astringents are indicated. Cold bathing, bark, blistering the sacrum or perineum, the internal exhibition of the tinct. canth., the shower-bath, electricity, and rubbing the spine and sacrum with stimulating liniments, are the chief means.

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* Retroversi uteri is almost the only case, in which it may become absolutely necessary to puncture the female bladder.

When the incontinence of urine is merely an effect of another disorder, the latter claims the principal attention.

The second species of incontinence of urine is of a spasmodic nature, and commonly depends on some irritation operating on the bladder. Hence, the indication is to find out the irritation, and, if possible, to remove it. Hemorrhoidal complaints, suppressed menses, a stone in the bladder, a fistula in ano, &c. may cause the affection. When the particular irritation cannot be discovered, general soothing and antispasmodic remedies, such as opium, the warm bath, fomentations, &c. should be prescribed. The uva ursi is said to be very useful in these cases: a scruple, or half a dram, of the powder may be given, three times a day.

This kind of incontinence of urine is frequently only a symptom of epilepsy, or hysteria. Sometimes, it is entirely dependent on some pressure on the bladder; and hence, it may be a symptom of polypi of the uterus, a prolapsus of this viscus, or difficult parturition.*

The last sort of case, to be mentioned, is that, in which the urine is involuntarily discharged in the night time, when the patient is asleep. The infirmity is mostly met with in young boys and girls; and, for the most part, spontaneously goes off, as they approach the adult state. Such subjects as are troubled, in this manner, should avoid drinking any fluid, just before going to bed, and should be particularly careful to empty the bladder, before they go to sleep.

When the infirmity afflicts adult persons, and does not yield to the above precautions, one-fourth of a grain of the powder of cantharides, given with milk of almonds, every evening, has been known to be of service. If this medicine should be ineffectual, the practitioner may try the effect of exhibiting a grain of opium, or two grains of ipecacuanha, every night, a little before bed-time.

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* The retention of urine, from paralysis of the bladder, is a case attended with an involuntary dribbling away of this fluid, if the catheter be not properly employed, and is a disorder, that has frequently been mistaken for that opposite malady, an incontinence of urine. As soon as the bladder is distended to a certain degree, the urethra being unobstructed, the continued secretion from the kidneys, instead of causing the bladder to give way, passes off through the natural channel. The discharge of urine leads the unwary surgeon never to suspect the real nature of the disease; but, if a catheter chance to be introduced, the quantity of urine drawn off immediately throws light upon the true character of the disorder.

I have not thought it necessary to describe in this treatise any particular apparatus for catching the urine, in cases, in which no cure can be accomplished.

There is a particular incontinence of urine, arising from the formation of a preternatural communication between the bladder and vagina. It is usually the consequence of a slough, and sometimes follows difficult labours. The continual dribbling of the urine, through the opening, generally prevents it from healing; but, by making the patient lie a good deal on her abdomen, the water is hindered from constantly escaping, and then the aperture sometimes heals.

Attempts have been made to close the preternatural opening, by scarifying its edges, and keeping them afterwards in reciprocal contact, for a certain time, by means of a twisted suture. If such an operation were found to be practicable, it would be proper to make the patient lie on her abdomen, as much as possible, during the space of two or three days, that is, till the suture were removed.

CHAP. LXII.

IMPERFORATE VAGINA.

THE vagina, in these cases, is commonly found shut up by a membrane, which is, in fact, the hymen, without any aperture in its centre. In new born infants, this membrane, sometime, extends so far forward, that it covers the orifice of the meatus urinarius, and prevents the evacuation of the urine.

When the membrane is situated behind the meatus urinarius, no inconvenience is perceived until the period, when the menstrual discharge commences. As this evacuation cannot escape externally, it accumulates in the vagina, so as to occasion several local and general complaints, which lead to an examination of the parts, and to the detection of the malformation. Pain in the loins; a sense of heaviness and tension in the uterus; hardness of the abdomen; frequent propensity to make water, and even a retention of urine; pain in going to stool, &c. are the inconveniences usually resulting from the imperforated vagina. The patient is also observed to have no evacuation from the uterus, at the age, when it naturally ought to take place.

At first, these complaints are only experienced once every month; but, they afflict the patient continually, when a large accumulation of blood has occurred. At length, giddiness, paleness, swelling of the belly, drowsiness, and efforts, like those of labour, exasperate the state of the case.

The nature of the disorder may easily be detected by an ocular examination. Careless practitioners, however, are apt to fall into error, and suppose, that all the above complaints originate from chlorosis, or pregnancy.

The operation, for the relief of this case, is very simple. The surgeon is to divide the membrane by a longitudinal incision, made from the place just below the meatus urinarius downward. After the accumulated fluid has been evacuated, the edges of the divided membrane are to be kept asunder for two or three days afterwards, by means of a dossil of lint. If the dark, thick discharge does not easily escape, warm water must be injected to promote the evacuation.

Although the operation has been performed with entire success, and several pints of blood have been discharged, three or four years after the commencement of the disease, yet, it ought to be known, that a considerable delay is always attended with two dangers. In the first place, when the blood accumulates in such quantity, that the vagina cannot contain it all, the uterus next becomes distended, and this fluid may escape through the Fallopian tubes, and be extravasated in the abdomen.* Secondly, when the menstrual evacuation has been a long while prevented from taking place in the natural way, in consequence of obstruction in the vagina, it may never admit of being re-established, notwithstanding the mechanical impediment be now removed. It is asserted, that, in one example of this sort, the menstrual discharge continued to be determined to the lungs and kidneys, although the obstacle to the evacuation being made in the natural way had been done away by a surgical operation.†

Sometimes, the vagina is closed, not by a membrane, but by a concretion of the opposite surfaces of the labia, nymphæ, and mouth of the vagina. No opening is discernible, except a small one, from which the urine flows. At the same time, there is always to be seen a white raphe, or line, extending from the aperture directly downward, and easily distinguished from the other parts by its firmness, and whiteness. This case is sometimes an original malformation; but, in other instances, it results from neglecting to keep the parts asunder, when in an excoriated state.

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* See De Haen's Ratio Medendi, pars sexta.

† Bresslauer Sammlungen, 1757.

When a director can be introduced, through the above opening into the vagina, the surgeon is to imitate Saviard, and pass a straight narrow bistoury along the groove of the instrument, and then make a division of the parts, in the direction of the above mentioned raphe.[§] When the director cannot be introduced, the surgeon must use the knife cautiously, taking care not to wound the rectum, or bladder.

When only the nymphæ are adherent together, the separation is very easily accomplished.

The divided surfaces are always to be kept asunder, by means of lint, or pieces of sponge, until the parts have become completely cicatrized.

Sometimes, in consequence of a congenital malformation, the opening of the vagina is closed by a fleshy mass. In one instance, the tumor seemed to grow from the inner surface of the labia, having, just below the clitoris, a small aperture, out of which the urine escaped. A probe, which was introduced, passed into the bladder, and could not be made to enter the vagina. An incision, however, being made through the middle of the fleshy mass, the vagina was opened. The portion of the tumor on each side was cut away, without any hemorrhage of importance, and a cure followed.[†]

In particular cases, the vagina is imperforate at a part more or less distant from its external orifice. The closure may be owing to adhesions, that have arisen from inflammation of the passage, after a difficult labour, or some other cause. They can only be detected by manual examination, and, with regard to the treatment, surgical writers recommend us to divide them with a pair of blunt pointed scissars.[‡]

In certain instances, a preternatural membrane, more or less deeply situated, entirely shuts up the passage. The further such membrane lies inwards, the more difficult are its detection, and the operation. Both, however, are facilitated by the menstrual discharge, which accumulates behind the membrane, urges it forwards, and makes it tense. When the vagina is thus imperforate at a distance from its external orifice, the menses may ac-

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[*] See Saviard's Obs. Chirurgicales, Obs. 32.

[†] Donauld, in Journal de Médecine, tom. 37.

[‡] Richter's Anfangsg. der Wundarzneykunst, band 6, p. 368.

cumulate in the uterus, and not only distend this organ, but also the Fallopian tubes, and be extravasated in the abdomen, producing fatal consequences. These tubes have even been found lacerated.*

When the preternatural membrane does not altogether close the vagina, and is deeply situated, it may never be detected; for, it does not prevent the evacuation of the menses, nor the act of copulation. But, if it is firm and indurated, it may prove a hinderance to parturition, or else lead to a dangerous laceration of the parts, unless a timely division of it be made, as the observations of those eminent writers, Ruysch, and J. L. Petit, confirm.†

Occasionally, the sides of the vagina itself become adherent to each other, or the canal is rendered imperforate, by the effects arising from ulceration and sloughing in the passage, the contraction of cicatrices, &c. Such mischief may be produced by difficult labours, or other causes. Examples are recorded, in which the vagina was closed to a considerable extent, and, yet, a cure was accomplished by dividing the obstruction. The following case is, in many respects, interesting. A young woman, twenty years of age, was affected with a hard swelling in the abdomen, below the navel, and with another smaller one, of the size of a hen's egg, situated on the left side. There also existed a preternatural formation of the parts of generation. Instead of the vagina, only a fissure, about half an inch long, was observable, into which the point of the finger could be introduced. The bottom of this slit was entirely closed, and had a hard firm feel. The patient experienced a sense of pressure and weight about the pelvis, and back, and pain in the hips; she lost her appetite, had a short respiration, and an accelerated pulse. She was also costive, and troubled with frequent inclination to make water; but, could only discharge it by drops, and with much pain. These symptoms sometimes became milder; sometimes, more severe. When they were violent, the abdominal swellings, which were regarded as being situated in the uterus and ovary, constantly acquired an increase of size. The bottom of the fissure was punctured with a lancet, and on the incision being carried to the depth of two inches, the retained menses began to be discharged, which were thick, and void of all bad smell. After about four pints had issued, the evacuation spontaneously ceased. The swellings in the abdomen had now diminished, though they had not entirely disappeared. As the patient, the day after the operation, was feverish, and suffered pain in the back, and her belly swelled, an emetic was administered. This excited a large evacuation of more bloody fluid, whereupon all the bad symptoms, and the tumors in the abdomen, completely subsided.*

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* De Haen's Ratio Medendi Pars Sexta; and, Sabatier's Médécine Opératoire, tom. 1, p. 365.

† See Observationum anatomico-chirurgicarum centuria. Amstelod, 1691, in 4to; and Traité des Maladies Chirurg. tom. 3, p. 110.

In certain examples, the os tincæ itself is imperforate, either in consequence of congenital malformation,† or of an obliteration of it by disease. When the opening is merely closed by a membrane, the menses themselves, after accumulating in a certain quantity, burst the unnatural obstruction, and effect a permanent cure.‡ Should this not happen, relief may be obtained by simply making a puncture with a curved trocar. When, however, the mouth of the womb is totally obliterated, an operation is a more hazardous proceeding. The attempt, indeed, has been known to be followed by violent inflammation and death.§ Yet, in some other instances, it has proved successful.‖ After the operation, injections must be employed, and an elastic catheter may be introduced, as well for this purpose, as for that of keeping the new opening pervious. In fact, in one case, the aperture closed, and a second operation was necessary.**

CHAP. LXIII.

IMPERFORATE ANUS.

OF this case, there are three varieties. In the first, the anus is either closed by a membrane, or it is too contracted to allow the feces to be easily evacuated. In the second, the anus appears to be properly formed, and the finger, or probe, may be introduced into the cavity of the rectum, for some way; but, this terminates in a *cul-de-sac* above. In the third kind of case, there is no vestige whatever of the anus.

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* See Duncan's Medical Commentaries, vol. 9.

† Hemman's Versuche and Journ. de Médécine, tom. 65.

‡ Block's Bemerkungen.

§ Matthieu in Hist. de la Societè Royale de Médécine, ann. 1777. 1778.

‖ Hemman.

** See Richter's Anfangsgr. der Wundarzneykunst, band 6, kap 18; and Hemman's Versuche.

With such malformations, we may arrange cases, in which the rectum opens into the bladder, urethra, or vagina. When such a circumstance occurs in female children, they may possibly live, in consequence of the great dilatation, of which their urethra is susceptible, and the vagina being a sufficiently capacious passage for the exit of the feces. Male children, on the contrary, must inevitably perish.

The first kind of imperforation is easily distinguishable. The child does not discharge the meconium; he makes great efforts, which are at last attended with convulsions. A membrane, of rather a transparent nature, is visible in the situation of the anus, and through it, the colour of the meconium may be seen. In consequence of the continual efforts, which the infant makes, the membrane becomes more and more protruded, so as to form a tumor. When there is a very small opening, the fluid part of the meconium escapes; the child makes less considerable efforts; but, these are sufficient to excite alarm. The defect is readily detected by an examination.

If the anus should be closed with a membrane, this may have a crucial incision made in it, and if necessary, the angles may then be removed. The frequent evacuation of the intestinal matter will be quite sufficient to keep the opening pervious.

When there is an aperture at the anus, but, it is too narrow, it must be dilated, in the most convenient direction, by means of a crooked bistoury and a director. This case is not so simple as the former one; for, the extremity of the rectum may be contracted, as well as the integuments. In this circumstance, the edges of the wound will be very prone to contract again, if not kept mechanically dilated, until a complete cicatrization has taken place. The whole of the sphincter ani may also be cut, and an inability to retain the feces be the irremediable consequence.

The second species of imperforate anus is highly dangerous, on many accounts; but, particularly, because very liable to be a long time unnoticed, by reason of the external appearance of the parts being natural. The impediment to the passage of the excrement may be ascertained by introducing the little finger into the rectum, or, when this is impracticable, by using a probe. If the obstruction is near the end of the rectum, a division of it might be made with a narrow knife. M. Sabatier recommends cutting from the sacrum, towards the scrotum, or pudenda.* Any stoppage, situated far up the intestine, can only be removed by puncturing it with a trocar, introduced through a cannula. The instrument should have a curve, corresponding to the semilunar form of the rectum. This operation is performed as it were, in the dark, and is, by no means, a pleasant one to undertake.

The third kind of imperforate anus, presents nothing externally, by which the situation of the end of the intestine is indicated. This part may be so remote, that it would be impossible to find it by any practicable method. How can cutting instruments be employed in so deep a situation? If the operator were to succeed in procuring an exit for the meconium, through what a thickness of parts would it not have to pass? The light of anatomy, as M. Sabatier observes, would here be invoked in vain. Almost all infants have died soon after an operation for this sort of imperforation, even though the rectum had been found and opened.

In these cases, it has been proposed by Littre to cut into the abdomen above the left groin, and to endeavour to establish an artificial anus, by opening the colon in this situation. Such an operation, indeed, seems to have been practised with success, by a French surgeon, named Duret.†

One would suppose, that an imperforate anus, that does not admit of being remedied, must unavoidably prove quickly fatal. Yet, if credit is to be attached to certain cases on record, children may live several months,‡ and even years,§ with an imperforate anus, the excrement, during such time, being ejected by vomiting, as often as occasion requires. For my own part, I am inclined to judge of the veracity of these instances, by considering, according to the maxim of Hume, which would be the greatest miracle, the truth of these marvellous assertions, or the falsity of the evidence, by which they are supported.

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* Médécine Opératoire, tom. 1, p. 353.

† Sabatier, Médécine Opératoire, tom. 1, p. 365.

‡ Journal de Médécine, ann. 1770, p. 510.

§ Lib. cit. tom. 8, p. 60.

CHAP. LXIV.

FISTULA IN ANO.

THIS term is applied to every abscess in the vicinity of the anus; but very improperly; for, the idea of there being a fistula naturally leads to the adoption of measures totally different from those, which are applicable to common abscesses.

Sometimes, the complaint makes its attack, in the form of phlegmonous inflammation, attended with sympathetic fever. A part of the buttock near the anus is considerably swollen, and has a large circumscribed hardness. The middle of this hardness soon becomes very red, and matter forms in its centre. As Mr. Pott remarks, the pain is sometimes great, the fever high, the tumor large, and exquisitely tender; but, however high the symptoms may have risen, before suppuration, yet, when that end is fairly and fully accomplished, the patient generally becomes easy, and free from fever. The matter, though plentiful, is good.

On other occasions, the fistula in ano begins, as an erysipelatous inflammation, without any of the circumscribed hardness, which characterizes the preceding tumor. The affection, on the contrary, spreads more extensively; the disease is more superficial; the quantity of matter small, and the cellular membrane sloughy to a considerable extent.

Sometimes, the complaint begins somewhat like a carbuncle. The skin is of a dusky red, or purple kind of colour, and, although harder, than in the natural state, yet it is not nearly so tense as in phlegmonous, or erysipelatous inflammation.

At first, the pulse is full and hard; but, if no relief be obtained, it soon becomes unequal, low, and faultering; and the strength and spirits are greatly dejected. The matter formed under the skin, is small in quantity, and bad in quality, and the cellular membrane is in a sloughy state. This species of the malady affects persons, whose habit, as Mr. Pott remarks,* is either naturally bad, or has been rendered so by intemperance.

These different affections often influence parts in the neighbourhood of the disease. Hence, retention of urine, strangury, prolapsus ani, tenesmus, piles, diarrhœa, or obstinate costiveness, are frequently added to the above described mischief.

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* Treatise on the Fistula in Ano, Chirurg. Works, vol. 3.

Sometimes the fistula in ano, first appears as an induration of the skin near the anus; but, without pain, and alteration of colour; which hardness gradually softens and suppurates.

The matter may either point in the buttock, at a distance from the anus; or near this latter part; or in the perineum. The matter may escape from one opening, or from several. Sometimes, there is not only an external aperture, but another internal one communicating with the cavity of the intestine. In other instances, there is only one external, or internal opening.

The matter may be formed at a considerable distance from the rectum, which is not even laid bare by it; in other cases, it is laid bare, but not perforated; sometimes it is both denuded, and pierced.

TREATMENT.

These inflammations can scarcely be prevented from falling into suppuration. Hence, the indications are, to moderate the symptoms, to promote the formation of matter, and, when this has collected, to let it out, and treat the sore, in such a manner, as shall be most likely to produce a speedy cure.

A soft poultice is the best application for promoting suppuration. When the inflammation is phlegmonous, the thinner the skin is suffered to become, before the abscess is opened, the better. If the patient be of a full, sanguine habit, venesection, and mild purgatives, are proper.

When the attack is of an erysipelatous kind, and there is a sloughy state of the cellular membrane, the sooner it is opened the better. As Mr. Pott observes, if we wait for the matter to point, we shall wait for what will not happen, at least, not till after a considerable length of time, during which the disease in the membrane will extend itself, and, consequently, the cavity of the sinus, or abscess, be thereby greatly increased.

When the fistula in ano commences with that kind of inflammation, which a carbuncle exhibits, no evacuations are necessary. The part should be opened early by a very free incision.

In opening all abscesses about the anus, the incision should be so large as to divide all the skin covering the matter. Thus the abscess will be discharged at once; future lodgment of matter will be prevented; and convenient room will be made for the application of proper dressings.

All fistulæ in ano do not necessarily interest the rectum; sometimes the matter is so distant from the intestine, that the surgeon has no more to do with this part, than if it did not exist, and the abscess is to be treated upon general principles.

The idea of callosity, naturally attached to the term fistula, is the great cause, why former surgeons were in the habit of distending abscesses, about the anus, with escharotics, and why they even sometimes cut away considerable portions of flesh. It is true, there is hardness generally surrounding fistulæ in ano; but, this is only such as accompanies every other description of abscess.

The dressings, applied to the cavities of these collections of matter, ought to be so small in quantity, as to allow nature to approximate the sides of the cavity together, and they should be quite unirritating.

By such simple treatment, the necessity of meddling with the rectum will often be removed. But, it more frequently happens, that the intestine, although not pierced by the matter, has yet been so denuded, that the sinus will not heal, without laying the cavity of the abscess, and that of the intestine, into one.

The operation consists in dividing the rectum, from the top of the hollow, in which the matter is lodged, as far as the anus. Thus the sinus is converted into an open wound. A narrow, curved, probe-pointed knife, is the proper instrument, and if it can be guided by the director, introduced through the track of the fistula, quite as far as the intestine, so much the better. The surgeon's fore-finger in the rectum will here feel the point of the knife. Then the director, if used, is to be withdrawn, and the operation is to be completed, by bringing the knife out, with its point applied to the finger, which was in the intestine. In this manner, all that is between the edge of the knife and the anus, must obviously be divided.

Immediately after the operation, a soft dossil of fine lint should be introduced, from the rectum, between the lips of the incision. This first dressing should remain, till loosened by suppuration. All the future dressings should be light, soft, and unirritating. The hardness and swelling, following the operation, must not be regarded as a diseased callosity, or lead the surgeon to use pernicious escharotic applications. A T bandage is usually employed.

We have now to consider fistulæ in ano in the state, in which they are after having spontaneously burst.

When the matter has only made its escape through external openings, these are termed *blind external fistulæ*. When the matter has only an opening in the intestine, and none in the skin, the fistula is called a *blind internal one*. Fistulæ, having an opening, both in the skin, and gut, are termed *complete*. The first and last kind of case is the most common. A probe is to be introduced to ascertain the nature of the case, and the operation, already described, is the proper one for obtaining a cure. When there are several openings, and corresponding sinuses, they are all to be divided, so as to make one cavity of the whole. This can be most conveniently done with a curved knife.

In cases of *blind internal fistulæ*, if the bursting and discharge of the matter should not produce a cure, which they sometimes do, though very seldom, an external opening is to be made into the collection of matter, and then the same operation, as has been already described for other cases, is to be put into execution. The place, where the outward opening should be made, is always sufficiently indicated by the induration.

When the sinuses of abscesses have become really and truly fistulous, in consequence of mismanagement, and their long existence, nothing more is necessary, than to lay them freely open, and dreſs them with simple unirritating applications. Sometimes, the health must yet be improved, before a cure can be accomplished, and many, who cannot recover in hospitals, do so on removing into the country, where the air is more pure.

CHAP. LXV.

PROLAPSUS ANI.

OF this complaint, there are three varieties; in one, the rectum, together with all its tunics, falls downward; in another, only its internal coat is protruded; and, in the third species, the upper portion of the intestine descends into the lower one, so as even sometimes to protrude at the anus. The last case is termed a *volvulus*, or *intussusceptio*. When we speak of a *prolapsus ani*, we commonly mean the first kind of disorder. As the intestine descends, it becomes turned inside out: hence, the outside of the protruded part is, in fact, the inside of the gut.

There are two kinds of causes, by which the prolapsus is produced, viz. such as weaken the sphincter, and parts, retaining the rectum in its situation; or such as force the intestine downward. Those of the first description are only predisposing ones; but, the latter causes often occasion a prolapsus quite independently of the others. Costiveness, and hardened feces, which distend the rectum and sphincter ani; and emollient clysters, which relax these parts; are the chief predisposing causes. The prolapsus ani is mostly seen afflicting children and aged persons; the first, on account of the relaxation and elasticity in their systems; the latter, on account of the want of muscular power in the sphincter ani. When the rectum has once descended, a weakness and relaxation are very apt to continue afterwards, occasioning a recurrence of the complaint from the slightest causes. Among the second class of causes, we have to enumerate, long continued inclination to go to stool, kept up by hemorrhoids; ascarides; fistulæ in ano; a stone in the bladder; diarrhœa; labour pains, &c.

When the prolapsus is recent and inconsiderable, its reduction may be frequently effected by gentle pressure with the hand. But, when the protruded portion of the gut is large, and the prolapsus has existed several hours, the reduction very often cannot be so easily accomplished. Then the following plan is to be tried. The patient having emptied his bladder, is to place himself in a position, in which he rests upon his knees and elbows. The surgeon is now to try to reduce the prolapsus, by making alternate pressure, first on one side; then on the other, of that portion of the gut, which is nearest the opening, until the whole is returned. Though the whole may have been reduced within the anus, still the gut is ready to protrude again at the first opportunity. Hence the prolapsed piece of intestine must be pushed further upward, than just within the anus.

Sometimes the reduction cannot be effected, on account of an incessant, involuntary, spasmodic straining. Here soft poultices, and opiate draughts, and clysters, are indicated. A great quantity of hardened excrement in the large intestines may render reduction difficult: in this case, the object can frequently be accomplished, after the bowels have been emptied by clysters. When the prolapsed portion of the gut is very much swollen, its size may be lessened by applying leeches, or cold lotions to it; or by making long-continued pressure, before trying to reduce it. After the prolapsus has been reduced, the patient must keep himself, for a time, in a horizontal posture, for the intestine is very prone to fall down again. Also, to prevent this event, corroborant astringent clysters may be administered. But, above all things, it is essential to keep the bowels free from costiveness.

When reduction is long delayed, the tumor may become painful and inflamed. Schmucker confirms, that the same symptoms as attend a strangulated hernia, and even death, may follow the protraction of the case. The immediate cause is the constriction, produced on the bowel by the sphincter ani. The proper line of conduct for the surgeon is, to employ general, and, particularly, topical bleeding; cold lotions; and gentle, long-continued, equal pressure. If such measures should fail, and the dangerous symptoms increase, it is necessary to divide the sphincter ani, by means of a curved bistoury, and a director.

Every prolapsus occasions a remaining weakness and relaxation, in such parts, as retain the bowel in its natural position; and, for this reason, the complaint, when neglected, often becomes habitual. A proper bandage, and corroborant astringent clysters, may here be of service.

The clysters are usually composed of the decoction of oak bark, with alum, port wine, &c.

When these fail, some benefit may be obtained from wearing the T bandage, with a piece of sponge, applied, as a compress, to the anus. It is to be observed, however, that though bandages keep up the bowel, a *volvulus* frequently follows their employment, and as they are of necessity taken off, when the patient goes to stool, they present a very faint prospect of radically curing even the prolapsus ani, as the bowel regularly descends, whenever there is a motion. The patient should be cautioned to prevent the descent of the gut with his finger, on this occasion; But, he cannot always hinder the accident.

When a prolapsus ani has been neglected, and has not been kept properly reduced, the protruded rectum often loses all vestige of its natural texture, and becomes indurated, exceedingly thickened, and, as it were, quite callous and insensible. The patient experiences no inconvenience, except what results from a large, hard tumor at the anus. Hence, the disorder is usually left to itself. However, frequently, a long perseverance in a horizontal posture, long-continued pressure, and the constant use of cold washes, have been known to diminish the size of such a tumor, so as to render its return practicable. If the large callous tumor should ulcerate, impede the exit of the feces, or become, in any other way, exceedingly troublesome, the surgeon may amputate the part.

VOLVULUS, OR INTUSSUSCEPTIO.

This is hardly to be distinguished from the prolapsus ani. The protruded intestine is not the rectum; but, the colon. The cœcum, and even the ilium, may protrude out of the rectum:[*] then, of course, the nature of the case is clear, from the structure of these viscera. The parts may be returned into the rectum; but, the disease, when it has made much progress, is almost entirely out of the reach of art; for, who can undertake to replace the colon, much less the other intestines, into their natural position? Besides, in the generality of examples, there are such adhesions, as preclude the possibility of any effectual interference. Having elsewhere considered this subject in detail, I shall not here expatiate upon it, more especially, as it is a disease, that does not necessarily claim a place in an introductory work.

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[*] Sabatier, in Mémoires de l'Acad. de Chirurgie, tom. 15; Langstaff, in Edinb. Med. and Surgical Journal, vol. 3.

CHAP. LXVI.

PROLAPSUS UTERI.

IN this case, the uterus falls down into the vagina, and the os tincæ may be distinguished just behind the vulva. Sometimes, the womb is even completely protruded from the vagina, so as to become situated in front of the external parts of generation. The first is the *incomplete*: the second the *complete prolapsus uteri*.

Patients, having an incomplete prolapsus, experience various inconveniences, which originate from the pressure of the uterus on the bladder, and rectum, and from the dragging of such parts, as are connected with the displaced viscus. The principal complaints, from the first cause, are impediments to the passage of the feces, and retention of urine. A painful stretching sensation in the loins arises from the second one. The pressure, and irritation, of the tumor on the surrounding parts, are also usually productive of a great discharge.

When a complete prolapsus happens, the symptoms, dependent on the pressure of the uterus on the adjacent parts, abate; but, those, which arise from the dragging of parts connected with this viscus, very often now undergo a considerable exasperation. The cervix uteri, in descending, always carries downward with it the upper part of the vagina. When the uterus is protruded out of the external parts, the whole vagina is drawn downward with it, so as to cover the external surface. The uterus now hangs down at the labia, between which, and the viscus, there is no interspace, into which the finger, or probe, can be introduced. This case cannot happen without the bladder and rectum being considerably deranged, in regard to position. The first is always drawn backward, so as to take the natural situation of the uterus, and assume, as well as the meatus urinarius, a horizontal position. Hence, we see in what direction a catheter should generally be introduced in these cases.

As the return of blood from the prolapsed uterus is usually more or less obstructed, the part frequently becomes very much swollen, and even copious discharges of blood occur. The naturally delicate texture of the lining of the vagina undergoes such an alteration, that it seems more like the structure of the common integuments.

The friction of the clothes on the swelling, however, mostly occasions very painful ulcerations on the outside of the vagina, if the prolapsus should be recent. But, when the parts have been long down, they adapt themselves to their new situation, and, hence, we see an old neglected prolapsus attended with no particular occurrences, except the descent of the tumor, when the patient is erect, and its return when she is in a recumbent posture.

Polypi are the only disease, with which the prolapsus uteri can be confounded; and the mode of discrimination must be learnt by referring to the chapter on this other subject.

The causes of the prolapsus uteri are such as either relax the parts retaining the uterus in its natural position, or such as force this organ downward. Women, who have had many children, are particularly subject to the complaint. The prolapsus is also very liable to occur soon after delivery, when all the parts of generation are dilated and relaxed.

The second class of causes are, any great exertions, or concussions of the body; but, we can hardly conceive, that such circumstances would be adequate to the production of the case, if the vagina, and parts, retaining the uterus in its situation, were not greatly relaxed. A prolapsus uteri cannot easily happen during pregnancy; and, even when a woman, having this affliction, becomes pregnant, she is generally freed from it, as the uterus enlarges. Yet, there are some cases recorded, in which the gravid uterus suffered a prolapsus;* and the accident has sometimes actually taken place at the time of labour.†

There are two indications in the treatment: viz. to reduce the uterus into its natural position; and to prevent its descending again. The first object is, in general, very easy of accomplishment, when the prolapsus is incomplete. The second is effected by making the patient wear a pessary in the vagina, and use corroborant astringent injections.

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* Giraud, Journal de Médecine, tom. 45; Portal, Mém. de l'Acad. de Chirurg. tom. 3.

† Ducreux, Mém. de l'Acad. de Chirurg. tom. 8, p. 393, edit. in 12mo.

The reduction of a complete prolapsus, of long standing, is sometimes difficult. The operation should be done before the patient gets out of bed in the morning. It is sometimes of use to empty the large intestines, by a clyster, before attempting reduction. However, the thickening of the prolapsed viscus, and the alteration made in the position of the surrounding parts, in some instances, render the design quite impracticable. A prolapsus uteri of very long standing, like an old hernia, sometimes cannot be reduced, without the most dangerous symptoms being induced.* In this circumstance, we must be content with drawing off the urine with a catheter, if requisite, and supporting the part with a bandage.

The presence of ulcerations is no reason for not attempting to reduce the displaced part. When the tumor is very much inflamed and swollen, we are sometimes advised to defer the attempt to replace the uterus, until the effect of bleeding, cold washes, &c. has been tried.

In recent cases of prolapsus uteri, we may hope to effect a radical cure by bringing the relaxed and dilated parts into another state. This may be accomplished by introducing into the vagina, immediately the uterus has been reduced, a sponge, which is to be frequently wetted with some astringent lotion. A compress, supported by the T bandage, is, also, to be applied to the external parts of generation. The patient must remain in a horizontal posture, and carefully avoid all strong efforts in going to stool, making water, &c. The piece of sponge should be of a globular, or cylindrical shape. Cold clysters may, likewise, be injected.

Whenever a radical cure cannot be performed, pessaries are to be worn, that is, if the part can be reduced. For a description of pessaries, I must beg leave to refer the reader to books on midwifery.

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* Richter's Chir. Bibl. 3. B. p. 141.

CHAP. LXVII.

INVERSIO UTERI.

SOMETIMES, the uterus descends through its own mouth into the vagina, and, occasionally, quite out of the vulva. The first is the *incomplete*, the second the *complete inversio uteri.* In the latter case, the vagina is, also, drawn downward, and inverted, so that the whole tumor, situated before the parts of generation, seems to hang by a pedicle, formed of the inverted vagina. Between this pedicle, and the labia, there is no interspace, into which a probe can be passed. The outer surface of the tumor is, in fact, the inner lining of the uterus.

As the fundus uteri evidently cannot descend through the os tincæ, unless this aperture be very much dilated, it is obvious, that the inversio uteri can only occur immediately after delivery. An unskilful employment of force, in extracting the placenta, is one common occasion of the accident. Polypi, growing from the fundus uteri, however, are particular cases, in which the inversion of this organ may occur from its being dragged downward by the weight of such tumors.

Great pain, inflammation, tumefaction, and hemorrhage, usually follow the inversio uteri. Even mortification, convulsions, and death, may take place, in consequence of the complete stage of the disorder, particularly, when it has occurred in a very sudden manner.

The method of distinguishing the case from a polypus, has already been noticed in the first part of this work.

The reduction of the inverted uterus ought not to be delayed a moment. The longer the operation is deferred, the more difficult it becomes; for, in general, pain, inflammation, and swelling, come on with great rapidity. When inflammation has already occurred, leeches and fomentations should be applied to the tumor, and the reduction be afterwards attempted.

In very old cases, in which the fundus uteri has suffered long compression in the vagina, the viscus becomes altered in its structure and figure so much, that the inversion is totally incurable. The further descent of the viscus can only be prevented by the employment of a pessary.

The uterus, besides being completely inverted, may also be in a scirrhous, or actually cancerous state. In this circumstance, there are precedents enough on record, exemplifying the propriety of amputating the diseased organ.*

CHAP. LXVIII.

RETROVERSIO UTERI.

THE uterus may either be turned forward, or backward; the last is the most common, and is named *retroversio.* In the first case, the fundus uteri becomes situated towards the os pubis, over the fundus of the bladder; while the os uteri is inclined towards the sacrum, and middle part of the rectum, and is often situated so high up, that it can hardly be reached by the finger.

The patient generally experiences a constant inclination to make water; feels pain whenever pressure is made above the os pubis; and, on standing up, perceives a hard body fall on the bladder, compelling her to empty this receptacle; but, the tumor regularly falls backward again, when she lies on her back.

In general, this case may be easily relieved. The practitioner should place the patient on herback, and make pressure with his hand just over the os pubis. At the same time, a finger, introduced to the upper part of the vagina, is to press it forward, so as to urge the os uteri forward, while the pressure of the other hand is tending to push backward the fundus. The recurrence of the accident is to be prevented by introducing a pessary to support the os uteri; keeping the patient on her back; and applying a compress and bandage to the abdomen just above the pubes.

In the true retroversio, the os uteri is inclined towards the pubes, while its fundus is approximated to the sacrum, and descends so far between the rectum and vagina, that it occasions a tumor at the posterior side of the latter tube. The viscus, thus situated, may render the passage of the feces exceedingly difficult, and even impossible. As the preternatural position of the uterus necessarily displaces the bladder and urethra, retention of urine always attends the case, and this is the more troublesome, as the catheter, in such circumstances, cannot be very easily introduced. The orifice of the urethra is so drawn upward, that it is sometimes situated higher, than the arch of the pubes. When the bladder is very much distended, it prevents the os uteri from being felt with the finger. The retroversio uteri commonly happens during the second, third, or fourth month of pregnancy. In the latter months, the uterus is too bulky to become situated between the vagina and rectum.

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* See Journal de Médecine, tom. 41; Fourcroy, Médecine Eclairée, tom. 4; Dieterichs, von einer Absetzung der Gebärmutter, Regensburgh, 1745, &c.

The retroverted uterus should always be replaced, as soon as possible, in its natural situation. The longer the case has lasted, the more difficult it is to rectify it, and the greater is the danger of the occurrence. The greatest urgency arises from the retention of urine, and impediment to the passage of the feces. The distention of the bladder and rectum, must naturally render the reduction of the uterus more difficult. Sometimes, abortion takes place, and this event has been occasionally known to be productive of relief.

As the return of the uterus to its natural position is always greatly facilitated by drawing off the urine with a catheter, this operation should be first performed. The uterus has often been known to resume its proper situation, on the bladder being emptied.* So much difficulty has been sometimes experienced in introducing a catheter, in these cases, that some practitioners have been obliged to puncture the bladder.† However, when the way, in which the urethra is displaced by a retroversio uteri, is well understood, such a proceeding will seldom be necessary. The rectum should, also, be emptied, if possible, by clysters.

Reduction is accomplished by making pressure on the fundus uteri, with two fingers, introduced into the rectum. The chief impediment to success arises from the projection of the sacrum. Hence, the pressure should be so directed, as to avoid forcing the uterus against this part. The operation should be accomplished, while the patient is kneeling, and leaning on her elbows; for, in this position, the uterus becomes more distant from the sacrum. The fundus uteri should be pushed upward and forward, toward the navel. Sometimes, it is preferable to make pressure with the fingers in the vagina.

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* Cheston, Medical Communications, vol. 2; Croft, London Medical Journal, vol. 11; Hunter, Medical Observations and Enquiries, vol. 4.

† Cheston, lib. cit.

CHAP. LXIX.

LITHOTOMY.

WHEN a stone in the bladder is trivial in size, and very smooth externally, little inconvenience may result from it. But, when it is large, or of irregular figure, it occasions various complaints. An uneasiness is felt at the extremity of the penis, and hence, patients get into the habit of drawing the prepuce repeatedly forward, so that it becomes greatly elongated; a sense of weight is experienced in the perineum; there is frequent inclination to make water, and go to stool; the stream of urine sometimes stops suddenly, and is discharged in an interrupted manner, although the bladder still contains a large quantity; the evacuation is attended with pain, especially, towards the end; the urine contains a good deal of mucus, and sometimes, when the patient has taken exercise, it contains also blood, and earthy particles. Besides such symptoms, there is a numbness in the thighs; the testicles are often painful, and retracted, &c.

An enlarged prostate gland is attended with symptoms, resembling those of a stone in the bladder; but, with this difference, that the motion of a coach, or horse, does not increase the grievances, when the prostate is affected, while it does so in an intolerable degree, in cases of stone. It also generally happens, that the fits of the stone come on at intervals, whereas the pain from a diseased prostate is neither so unequal, nor so acute.

As the symptoms of stone in the bladder bear a strong resemblance to those of several other affections, surgeons never form a decided opinion, until they have introduced a metallic instrument into the bladder, and actually touched the stone itself. As the extraneous body generally lies at the lowest part of this viscus, the sound is usually made less curved than a catheter, in order that it may more easily touch any thing situated immediately behind, and below, the neck of the bladder. The sound is only a particular kind of probe, and, as its chief use is to convey information, through the medium of the organ of touch, its handle should be smooth and well polished, so that as many points of its surface may be in contact with the fingers as possible.

The mode of introducing this instrument is the same as that of passing a catheter.

When it is in the bladder, it is to be pushed downward, for the purpose of ascertaining whether the stone lies beneath its convexity. If the extraneous body should not be felt in this manner, the instrument may be turned first to one, and then to the other side of the cavity of the bladder. Should the stone not be struck by moving the sound in this manner, the instrument may be drawn forward, for the purpose of learning, whether the calculus is more anteriorly situated. Frequently, the stone cannot be felt till the whole of the urine has been expelled, and the bladder has become contracted. Sometimes, the sound may be made to strike against the stone, by introducing the finger into the rectum, and thus bringing the extraneous body upward. The calculus is even very often distinctly perceptible to the finger.

Surgeons make it an invariable rule never to perform lithotomy, unless the stone can be plainly struck with the sound, or staff, immediately before the operation. A man may have a stone in the bladder to-day, and the surgeon may strike it so manifestly with the sound, as to make the circumstance perceptible to the ears of the by-standers, as well as to his own fingers; but, to-morrow, the stone may have protruded through the fasciculi of the muscular fibres of the bladder, carrying along with it a pouch, formed by the lining of this viscus, and, in this circumstance, the stone is no longer in the cavity of the bladder; consequently, it can neither be felt by sounding, nor extracted by the operation of lithotomy.

The rectum should be emptied by a clyster, before the time of operating; the contents of the bladder, however, should not be evacuated, if this event can be hindered.

LATERAL OPERATION.

The patient is to be placed at the edge of a firm table, and the staff is to be introduced into the bladder. Then two garters, each about two yards long, are to be doubled, and placed, by means of a noose, round the patient's wrists. The patient is now to take hold of the outside of his feet with his hands, in such a manner, that the fingers are applied to the soles. The two ends of the ligature are then to be carried round the ankle, next over the back of the hand, and under the foot. Then they are to be tied. In this manner, each hand and foot may be securely connected together.

The staff, in fact, is only a director, with a groove for guiding a cutting instrument into the bladder. It is shaped, like a sound, or catheter, in order to admit of being introduced through the urethra. However, it is more curved and longer, than these instruments; and its handle is rough, that the surgeon may hold it more firmly. There are two advantages in its being sufficiently curved: viz. its convexity is more plainly distinguishable in the perineum; and, on depressing the handle of the instrument, the groove, on the end of the convexity of the curvature, can be more readily made to run in the axis of the bladder. The utility of the length of the instrument is very obvious; as the operator is thereby less liable to think the staff in the bladder, when it is not so; and the beak of the gorget should still be in the groove, when introduced as far as necessary.

An assistant is to hold the staff, making its convexity prominent in the perineum, by keeping the handle of the instrument inclined towards the patient's abdomen. The person, who holds the staff, is to turn the groove a little towards the left side of the perineum, and is to raise the scrotum with his left hand, in order to expose the perineum completely to the surgeon's view.

In the majority of surgical works, the operator is directed to divide the bulb of the urethra, among other parts, cut by his first incision. This advice is particularly wrong, and the adoption of it is most likely to render the extraction of the stone exceedingly difficult. The operator, for instance, begins his incision as high as the bulb of the urethra, and extends it to the usual length; he next divides the prostate gland and neck of the bladder with the gorget. Now, on attempting to take out the stone, the external part of the wound is too high, in regard to the internal portion, and the same impediment to extracting the stone arises, as if the wound were too small. I am decidedly of opinion, that a free, and direct opening, for the passage of the stone, ought always to be made in the operation of lithotomy, and that the fatal termination of numerous cases, is entirely owing to the wound not being sufficiently ample and direct. The laceration of the bladder, which must happen under such circumstances, is too frequently productive of peritoneal inflammation, the most alarming consequence of the operation. Nothing has a greater tendency to render the wound indirect, than making the incision through the skin too high up, or, in other words, so high as to interest the bulb of the urethra.

On the contrary, the wound should commence an inch above the anus, over the membranous part of the urethra, at the place where the operator means to make his first cut into the groove of the staff; and the incision is to extend about three inches obliquely downward, to the left of the raphe of the perineum. Having made the necessary division of the integuments, the next object is to divide the transversales perinæi muscles, and to make an opening into the membranous part of the urethra, so as to be able to feel distinctly the groove and edges of the staff with the finger. Then the operator is to accomplish a most important object, and one, which is, for the most part, too much neglected; I allude to dividing the urethra with the knife, as far as possible along the groove of the staff, towards the bladder. In executing this part of the operation, the edge of the knife should be inclined laterally towards the left ischium, since, if the surgeon were to cut, with imprudent boldness, perpendicularly, he might wound the rectum. When the preceding directions have been properly observed, very little remains to be effected with the gorget.

Every operator should be particularly careful, that the beak of the gorget is accurately adapted to the groove of the staff. As far as my humble judgment extends, the gorget ought not to have its edge turned upward, at an angle of forty-five degrees, as advised by that able surgeon, Mr. Abernethy. By cutting in this direction, the pudendal artery is more apt to be wounded, than when the incision is made more in a transverse manner, because the rami of the ischium converge as they ascend; and, for the same reason, by using a gorget with an edge turned so much upward, the wound can hardly be made large enough for the extraction of stones of considerable size, to say nothing of the impossibility of making, with such an instrument, the incision in the neck of the bladder and prostate parallel to the oblique external wound.

Were the edge of Mr. Abernethy's gorget turned horizontally, a longer cutting edge might be employed, without risk of wounding the pudendal artery, because the incision would then be made in a direction, in which that vessel would not be so soon reached, as when the cut is inclined upwards. Thus, the operator, by becoming enabled to employ with safety a longer sharp edge to the gorget, the instrument would be better calculated to make a freer opening into the bladder, for the easy passage of the stone, and one of the principal objections to gorgets in general would be lessened, if not entirely removed.

The experienced Desault made a variety of improvements in Hawkins's gorget: one in particular appears to me to merit adoption: it is that of making the direction of the handle not deviate so considerably from that of the rest of the instrument, as it commonly does. The lateral direction of the handle of Hawkins's gorget is extremely objectionable; for it prevents the operator from pushing the gorget along the staff, with half the convenience and security, which are experienced, in employing a gorget improved by the foregoing alteration.

Desault also very properly objected to the concave form of the old gorgets, since it caused them to make an incision, in the neck of the bladder and prostate, attended with a semicircular flap above, which was apt to swell and obstruct the exit of the urine. He likewise censured a long beak, by which the opposite side of the bladder might be injured, and even pierced, so as to give rise to an extravasation of urine of the most perilous kind, because its situation would be inaccessible.*

Having made a free opening into the urethra, as low down as can be conveniently done, the operator is to place the beak of the gorget in the groove of the staff, and, being sure, that this is accomplished, he is to take hold of the handle of the latter instrument with his left hand, while with his right, he holds the beak of the gorget carefully applied to the groove of the staff, along which it is to glide into the bladder. But, before pushing the gorget onward, a most important thing is to be observed: this is, to bring forward the handle of the staff, to a right angle with the trunk, so as to elevate the extremity of the instrument in the bladder, by which means the gorget may be introduced, along the groove of the staff, in the direction of the axis of the above viscus. In fact, the gorget should be introduced nearly in a direction, corresponding to a line drawn from the os coccygis to the umbilicus, its beak being carefully kept in the groove of the staff. By following this plan, the gorget will never wound the rectum, nor insinuate itself into the cellular substance, between this intestine and the bladder. For the purpose of easily making the gorget cut in a direction, corresponding to that of the outer wound, Desault used always, just at the moment of introducing the latter instrument, to incline the staff a little to the left.

When the gorget has been introduced, the staff is to be withdrawn, and a proper pair of forceps is to be passed, along the concave surface of the gorget, into the bladder, for the purpose of seizing, and extracting the stone. While the operator is passing the forceps along the gorget, the latter instrument must be kept quite motionless, lest its sharp edge should do mischief; and, immediately the forceps is in the bladder, the cutting gorget is to be withdrawn.

It is even questionable, whether it would not be better always to withdraw the gorget, as soon as the incision is completed. Very good surgeons are of opinion, that when the wound is made in the above direction and free manner, there never can be any difficulty in passing the forceps into the bladder, without any guidance of the gorget. For my own part, I cannot conceive, that a blunt gorget need ever be introduced, after the cutting one has been withdrawn; for, the forceps must obviously pass through the wound, quite as easily as any blunt gorget can possibly do.

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* See Œuvres Chirurg. de Desault, tom. 2, p. 460.

The next object is to take hold of the stone with the blades of the forceps. In order to accomplish this purpose, the operator should not expand the instrument, as soon as it has arrived in the bladder; but, he should make use of the instrument as a kind of probe, for first ascertaining the exact situation of the stone. If this body should be lodged at the lower part of the bladder, just behind the neck of the viscus, and be distinctly felt below the blades of the forceps, the operator is to open the instrument immediately over the stone, and after depressing the blades a little, is to shut them, so as to grasp it. Certainly, it is much more scientific to use the forceps, at first, merely to ascertain the position of the stone; for, when this is known, the operator is far more able to grasp the extraneous body, in a skilful manner, than if he were to open the blades of the instrument immediately, without knowing where they ought next to be placed, or when shut. No man can doubt, that the injury, which the bladder frequently suffers, from reiterated and awkward movements of the forceps, is not an uncommon cause of such inflammation of this viscus, as is too apt to extend to the peritoneum, and occasion death.

When the stone is found to be so large, that it cannot be extracted from the wound, without violence and laceration, the surgeon may either break the stone with Mr. Henry Earle's instrument,* or with a strong pair of screw forceps, furnished with teeth for the purpose; or he may enlarge the wound with a common scalpel, or a probe-pointed curved bistoury, introduced under the guidance of the fore finger of the left hand.

To the employment of the knife in this circumstance, I must express my decided preference. Breaking the stone in the bladder is an exceedingly unpleasant occurrence, as it creates such a chance of calculous fragments being left behind.

However, when the stone is very large, the operator ought, undoubtedly, rather to endeavour to break it, than employ unwarrantable force in extracting it.

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* See Plate XI. A. A. A. the lever, which is first passed round the stone separately.

B. B. the two uprights, through which the lever A. A. A. is passed.

C. C. the screw, which also passes through the two uprights B. B.

D. the handle of the screw.

E. the pin, which keeps the lever and uprights together.

When this has been done, and as many of the broken pieces have been taken out as the forceps can discover, the surgeon should introduce his finger, in order to feel, whether any fragments still remain behind. If they should do so, his best plan, provided they are very small, is to inject lukewarm water, with moderate force, into the wound, for the purpose of washing them out.

The operator ought always to examine a stone, as soon as it is extracted: if its whole surface be rough, it is a presumptive sign, that it is the only one; if its outside should be smooth on one side, and rough on another, there may, very probably, be other stones. But, in every instance, the surgeon should introduce his fore finger, in order to obtain decisive information on this point; for, it would be unpardonable to put the patient to bed while another stone remains in his bladder.

Sometimes, stones in the bladder cannot be grasped with the forceps, unless raised by the index and middle fingers of the left hand, introduced into the rectum.

The majority of patients, who die in consequence of lithotomy, perish of peritoneal inflammation. Hence, on the least occurrence of tenderness over the abdomen, copious venesection should be put in practice. At the same time, eight or ten leeches should be applied to the hypogastric region. The belly should be fomented, and the bowels kept open with the ol. ricini. The feebleness of the pulse should not deter the practitioner from using the lancet; this symptom is only fallacious; and is attendant on all inflammation within the abdomen. Together with the above measures, the warm bath, blisters, and emollient clysters, are highly proper.

I have seen several old subjects die of the irritation of a diseased, thickened state of the bladder, continuing after the stone had been extracted. They had not the acute symptoms, the inflammatory fever, the general tenderness, and tension of the abdomen, as in cases of peritonitis, they referred their uneasiness to the lower part of the pelvis; and, instead of dying in the course of two or three days, as those usually do, who perish of peritoneal inflammation, they, for the most part, lingered, for two or three weeks after the operation. In these cases, opiate clysters, and blistering the hypogastric region, are proper.

In some instances of this kind, collections of matter form in the vicinity of the neck of the bladder.

LITHOTOMY WITH THE KNIFE.

It would be impossible, consistently with the plan of an introductory work, to describe the very numerous methods, which have been proposed for performing lithotomy without any cutting gorget. I shall merely mention a few of them.

CHESELDEN'S THIRD, OR MOST IMPROVED PLAN.

Mr. Cheselden used to take a catheter, first dipped in oil, and introduce it into the bladder, where having searched for, and discovered the stone, he used to give the instrument to one of his colleagues, whom he desired to satisfy himself, whether there was a stone, or not. The assistant, standing on his right hand, held the handle of the staff between his fingers and thumb, inclined it a little towards the patient's right thigh, and drew the convex side close up to the os pubis, in order to remove the urethra as far as possible from the rectum.

The groove of the staff being thus turned outward and laterally, Cheselden used to sit down in a low chair, and, keeping the skin of the perineum steady with the thumb and fore finger of his left hand, he made the first, or outward incision, through the integuments, from above downwards, beginning on the left side of the raphe, between the scrotum and verge of the anus, almost as high up as where the skin of the perineum begins to form the bag containing the testicles. Thence, he continued the wound obliquely outwards, as low down as the middle of the margin of the anus, at about half an inch distant from it near the skin, and, consequently, beyond the tuberosity of the ischium. He was always careful to make this outward wound as large as he could with safety. Having cut the fat rather deeply, especially near the rectum, he used to put his left fore finger into the wound, and keep it there till the internal incision was quite finished; first to direct the point of his knife into the groove of his staff, which he now felt with the end of his finger, and likewise to hold down the rectum, by the side of which his knife was to pass, and so prevent its being wounded. This inward incision Cheselden made with more caution, than the former. His knife first entered the groove of the rostrated, or straight part of the catheter, through the sides of the bladder, immediately above the prostate, and, afterwards, the point of it continuing to run in the same groove in a direction downwards, and forward, or towards himself, he divided that part of the sphincter of the bladder, which lies upon that gland, and then he cut the outside of one half of it obliquely, according to the direction and whole length of the urethra that ran within it, and finished his internal incision, by dividing the muscular portion of the urethra on the convex part of his staff.

A sufficient opening being made, Cheselden used to rise from his chair, his finger still remaining in the wound. Next he put the beak of his gorget in the groove of the staff, and then thrust it into the bladder. The staff was now withdrawn, and, while he held the gorget with his left hand, he introduced the forceps, with the flat side uppermost, sliding them with great caution along the concavity of the gorget. When they were in the bladder, he withdrew the latter instrument, and taking hold of the two branches of the forceps with both his hands, he searched gently for the stone, having them still shut. As soon as this was felt, he used to open them, and try to get the lower blade under the stone, that it might fall more conveniently into their chops, and be laid hold of. This being done, the stone was extracted with a very slow motion, in order to give the parts time to stretch and dilate, the forceps being turned gently in all directions.

LITHOTOME CACHÉ.

The surgeons of the Westminster Hospital have lately revived the operation, practised by Frére Cosme. A common staff is introduced into the bladder; the first incision is made in the ordinary way; the urethra is cut in the same place, and in the same manner; but instead of the gorget, the *lithotome caché* is introduced along the groove of the staff, into the bladder. The staff is now removed, and the bistoury turned, in such a manner, that its edge faces the left side of the bladder. The lever being now compressed, the knife rises out of the groove, in which it was concealed, and the instrument is then withdrawn by one uniform motion. The operation is finished, in the same manner, as when a gorget is used.

I have never seen this operation performed; but, it seems to deserve encouragement, or, at all events, further trial, on account of its simplicity, and the smoothness, with which the parts must be divided. I am ready to grant, that the laceration of the bladder, frequently attendant on the usual mode of performing lithotomy, is, for the most part, owing to the smallness of the wound, in relation to the size of the stone; but, I am firmly of opinion, that the gorget itself, when it is badly made, or its beak does not accurately correspond with the groove of the staff, sometimes tears the fibres, instead of cutting them in a smooth, and even manner.

The great force, which operators are frequently obliged to exert, when they push the gorget into the bladder, is a proof of the violence, which the wounded parts must suffer.

The danger of cutting the whole side of the bladder, or of wounding the pudendal artery, and rectum, does not seem to me so great as Mr. Charles Bell would lead one to believe.

With respect to wounding the whole side of the bladder, such an occurrence cannot happen, unless the blade be allowed to start out to an immoderate distance. The pudendal artery cannot be so liable to be cut by a narrow bistoury, with which the surgeon cuts, just as far as his prudence dictates, towards the rami of the ischium, as when a broad cutting gorget with its edge directed more or less upward, is mechanically introduced. As the bladder ought always to be cut, in one direction, whether a gorget, or a knife be employed, I see no reason, why the rectum should be more exposed to a wound in this, than in the common operation. However, I can readily conceive, how Frére Cosme, or any other surgeon of old times, might even contrive to wound the rectum.

I shall only observe further, in favour of the lithotome caché, that it is in common use in France, and that, of late, Mr. A. Cooper has employed it.

MR. JOHN BELL'S PLAN.

This gentleman recommends the external incision, in a large man, to commence about an inch behind the scrotum, and to be carried downwards three inches and a half, midway between the anus and tuberosity of the ischium. The fingers of the left hand, which are at first to keep the skin tense, are now to be applied to other purposes. The fore finger is now to guide the knife, and the operator is to dissect through fat and cellular substance, and muscular and ligamentous fibres, till the wound is free and open, till all sense of stricture is gone; for, it is only by feeling opposition, and stricture, that we recognize the transverse muscle. The external incision, *which relates merely to the free extraction of the stone, is now completed.* If it were the surgeon's design to operate only with the knife, he would now push his fingers deeply into the wound, and, by the help of the fore finger, dissect from the urethra along the body of the gland, till he distinguished its thickness and solidity, and reached its back part. Then, plunging his knife through the posterior portion of the gland, and setting it in the groove of the staff, he would draw it firmly and steadily towards him, at the same time pressing it into the groove of this instrument, and then the free discharge of the urine assuring him, that the prostate and neck of the bladder were divided, he would lay aside his knife, pass the left fore finger into the bladder, withdraw the staff, and introduce the forceps.*

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* John Bell's Principles of Surgery, vol. 2, p. 197.

MR. CHARLES BELL'S PLAN.

This surgeon conceives, that the best method of performing lithotomy, may be accomplished with a staff grooved on the right side, a scalpel with a straight back, and the common lithotomy forceps.

The surgeon is to make his incision under the arch of the pubes, by the side of the anus; he is to make the wound more deeply, towards the face of the prostate gland, cutting near the staff, but not cutting into it, and avoiding the rectum by pressing it down with the finger.

Now, carrying the finger along the staff, the prostate gland is felt. The point of the knife is to be passed somewhat obliquely into the urethra, and into the lateral groove of the staff, just before the prostate gland. The knife is pushed along the groove of the staff, until the urine flows. The fore finger follows the back of the knife, until this is in the bladder.

The finger being passed into the bladder is to remain there, while, at the same time, the knife is withdrawn. Then the forceps is to be introduced, under the direction of the finger.*

CHAP. LXX.

OF SPINA BIFIDA, OR HYDRORACHITIS.

SPINA BIFIDA is a swelling situated on the spines of infants, commonly on the lumbar vertebræ, occasionally on the dorsal, opening in the spine by applying a compress and bandage. The adhesive inflammation, in fact, obliterates the cavity, in which the fluid collects, and the disease ultimately does not return. In one case, Mr. Astley Cooper seems to have accomplished, in this manner, a perfect cure.*

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* Operative Surgery, vol. 1. Mr. Astley Cooper, not long ago, was in the habit of performing lithotomy, by means of a convex-edged dissecting knife, constructed with a beak, by which it is guided along the groove of the staff. Mr. T. Blizard also recommends a particular knife. See Plate X. fig. 3, 4, and 5. The knife, proposed by Mr. Gibson, may be seen at any instrument makers. Respecting the merit of all such instruments, they appear to me to possess little, or none at all. They are not better, than gorgets; or, rather, what are they but gorgets? It is the beak, that renders the employment of these last instruments mechanical; and makes the lateral operation, as it is now commonly done, so much less scientific and successful, than what it was in the hands of a Cheselden.

This excellent surgeon, however, pursues two modes of treatment, for the relief of children, afflicted with spinæ bifidæ; one palliative; the other, radical.

The first consists in treating the case as a hernia, and applying a truss to prevent its descent: the second, in pricking the tumor with a fine needle, and producing adhesion of the sides of the sac, so as to close the opening in the spine, and stop the disease altogether. The first is attended with no risk; the second exposes the patient to much constitutional irritation; but, if successful, hinders the future recurrence of the disease. Even when the adhesive process cannot be effectually accomplished, by the first plan, the second, or palliative method may yet be tried.†

There are numerous cases of spinæ bifidæ, however, which leave no hope of cure. The following examples of this description are pointed out by Mr. Astley Cooper.

If the tumor is connected with an unnatural enlargement of the head, hydrocephalus internus is conjoined with spina bifida; and the water will accumulate in the ventricles, if either the radical, or palliative treatment of the tumor on the back be tried.

If the lower extremities are paralytic, or the feces and urine are discharged involuntarily, there is no hope of relief.

If the tumor has burst at the time of birth, or soon afterwards, little expectation of a cure can be indulged; for, although the opening in the skin may be closed with lint and adhesive plaster, and union be produced, so that no more of the fluid can escape, yet, hydrocephalus internus will follow.

The deficiency of the spine is sometimes so great, that the tumor, at the time of the child's birth, is very considerable; the nerves are protruded out of the spinal canal; the spinal marrow is injured; and all attempts at a cure must be unavailing.‡

In this disease, purgatives and diuretics have been tried in vain; and no outward applications, excepting pressure, have been found to do the least good. Richter has suggested making two issues near the tumor;§ but, I do not know, that the proposal brings with it much promise of utility. In short, in the present state of our knowledge, the practice, tried by Mr. Astley Cooper, is the only one, in favour of which facts and actual experience can be adduced; and, if we except the cases adduced by this gentleman, we have no instance on record of a spina bifida being cured, or benefited.

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* See Medico-Chirurgical Transactions, vol. 2, case 2, p. 326.

† See Case 4, lib. cit.

‡ A. Cooper, lib. cit.

§ Anfansgr. der Wundarzneykunst, band 2, p. 240.

When the disease does not admit of the radical, or palliative cure, the surgeon should instruct the friends of the patient to keep the tumor out of the way of every thing, that has a tendency to make it inflame and ulcerate; and, if any thing at all is done, the swelling should be tenderly bathed, every now and then, with spirituous and mildly astringent lotions, with a view of averting inflammation and ulceration of the skin.

CHAP. LXXI.

DISEASED VERTEBRÆ.

THE disease, of which I next mean to treat, is an affection of the spine, attended with a total, or partial abolition of the power of using, and sometimes even of moving the lower limbs.

To this distemper, as Mr. Pott* remarks, children are the most subject; adults are by no means exempt from it; but, it hardly ever affects persons after the age of forty. In infants, the true cause of the paralytic disorder of the lower limbs is seldom discovered by parents, or nurses, who never imagine, that it is situated in the back-bone. When the disease affects a child, who has been able to walk, the loss of the use of his legs is gradual, though not very slow. He at first complains of being very soon tired, and is unwilling to move about much; and, very shortly afterwards, he frequently trips, and stumbles, although there be no impediment in his way. Whenever he attempts to move briskly, he finds, that his legs involuntarily cross each other, by which he is frequently thrown down. Upon endeavouring to stand erect, even for a few minutes, his knees give way, and bend forward. To continue Mr. Pott's accurate description, when the distemper is a little further advanced, it will be found, that he cannot, without much difficulty, and deliberation, direct either of his feet precisely to any exact point; and very soon after this, both thighs and legs lose a great deal of their natural sensibility, and become perfectly useless for all the purposes of loco-motion. In adults, Mr. Pott observed, that the progress of the disease was rather quicker, than in children.

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* See Remarks on that kind of Palsy of the Lower Limbs, which is frequently found to accompany a Curvature of the Spine, &c. in Pott's Chirurgical Works, vol. 3.

The affection of the lower limbs is somewhat different from a common nervous palsy. The legs and thighs are rendered unfit for all the purposes of loco-motion, and do also lose much of their natural sensibility; but, they have neither the flabby feel, which a truly paralytic limb has, nor that seeming looseness at the joints, nor that total incapacity of resistance, which allows the latter to be twisted in almost all directions. On the contrary, the joints are often very stiff, and the feet frequently cannot be placed flatly on the ground, in consequence of the toes pointing downward.

The disease of the spine varies in situation, extent, and degree, being either in the neck, back, and sometimes, though very seldom, in the upper part of the loins; sometimes comprehending only two vertebræ, sometimes three, or more.

Some patients are rendered totally incapable of walking, at a very early period of the distemper; others can manage to move about with the help of crutches, or by grasping their own thighs with their hands.

When a weak infant is the subject, and the curvature, resulting from the morbid state of the spine, is in the vertebræ of the back, it is not unfrequently productive of deformity, by rendering the back humped, and by alterations, which the position of the ribs and sternum undergoes, in consequence of the flexure and morbid state of the spine.

The general health does not seem, at first, to be materially affected; but, when the affection of the spine has made much progress, many complaints come on, such as difficulty in respiration, indigestion, pain, a sense of tightness in the stomach, obstinate constipations, purgings, involuntary discharge of the urine, and feces, &c.

The paralytic affection of the legs is certainly owing to the particular state, in which the spinal marrow, surrounded by the diseased vertebræ, is placed. When the distemper has existed only a short time, the ligaments, connecting the vertebræ, which form the curve, are somewhat thickened and relaxed, and the bodies of these bones affected with a change, similar to what I have described as taking place in the heads of bones, in cases of white swellings. When the distemper has been of longer existence, the ligaments are more manifestly thickened, and the bones more obviously altered, and even becoming carious. The quantity of elastic substance, between the bodies of the vertebræ, is much diminished, and, after death, in advanced cases, the bones are always found carious, while a quantity of sanious fluid is lodged between them and the membrane, investing the spinal marrow. I am inclined to believe, that the corpora vertebrarum, howsoever softened, diseased, or rendered carious, they may be, are never found spread, and enlarged, in their texture: at least, I have never seen them expanded in this way, though I have several times examined the parts after death. Mr. Pott was also convinced, that the bones were not expanded. The disease seems to be very analogous to the affection of the heads of the bones in the scrofulous white swelling, and, as we know, that this latter disorder is unattended with any real increase in the dimensions of the diseased parts of the bones, we ought indeed to expect, that no such change would prevail in the distemper now under consideration.

The curvature of the spine, attendant on the present disease, is always from within outward, and is invariably preceded, as well as the paralytic affection of the legs, by a distempered state of the ligaments and bones.

TREATMENT.

The only thing, from which relief is ever obtained in the present distressing affliction, is an issue, made on each side of the spinous processes of the affected vertebræ. The best mode of forming the issue is, to rub the kali purum cum calce viva on the skin, until the part turns brown. To accomplish this object in a neat manner, it is as well to cover and defend the integuments by adhesive plaster, excepting the two longitudinal portions, about half an inch broad, which are to be converted into eschars by the application of the caustic. The end of this substance is to be dipped in water, and freely rubbed on the situations of the intended issues. As soon as the skin has become quite brown, the caustic may be washed off with some wet tow, the adhesive plaster may be removed, and the part covered with a linseed poultice.

Immediately the eschars are loose, and can be taken away without pain, the issues are to be filled with peas, or kidney beans. These are to be covered with adhesive plaster, which will confine them in their situation. However, as the hollows soon become filled up with granulations, unless considerable pressure be made, it is generally deemed necessary to bind a piece of pasteboard, or a compress, containing a bit of sheet-lead, firmly on the situation of the issues. The pressure, thus maintained, though creative of uneasiness, at first, will in the end save the patient an immense deal of pain; for, in consequence of its operation, the peas, or beans, will soon form as many little hollows in the cavity of the issue, as their own number, and into these the future peas may afterwards be placed, and retained, without the least uneasiness, provided the surgeon give particular injunctions not to allow the bandage ever to be slack. The pressure saves the patient, in the end, a great deal of pain, which would otherwise be unavoidable, on account of the surgeon being necessitated to repress the rising granulations in the cavity of the issue, by sprinkling them with powdered cantharides, or the pulv. ex. ærug. æris et sabin., or even rubbing them with the caustic. In most instances, however, it is now and then requisite to apply one of the above powders underneath the beans, or peas. In order to apply peas advantageously, they should be previously softened in warm water, and connected together, like beads, by passing a thread through their centre. Then they should be allowed to become completely dry, when they are fit for immediate use. There should always be a greater length of thread, than of peas, by which means, two little portions, at the end of the peas, may extend beyond each extremity of the issue, and be first attached there by a very small piece of adhesive plaster. This little contrivance will have great effect, in keeping the whole row of peas in its right situation. When the issue is more than half an inch in breadth, two rows of peas should be placed in it.

It is said, that a string of beads answers quite as well as one of peas, or beans, and, certainly, it is more convenient; as, when regularly washed every day, it may be used as long as the surgeon thinks proper; thus the trouble and expence of getting fresh beans, or peas, are avoided.

The issues are to be kept open until the cure is complete, that is, until the patient perfectly recovers the use of his legs, or even for some time afterwards. Mr. Pott very properly notices, that it is prudent to heal only one of them first.

In conjunction with the issue, bark, sea-air, and sea-bathing, are frequently proper.

I am sorry I cannot add, that mechanically supporting the spine seems to present any rational prospect of doing good. When the morbid affection of the corpora vertebrarum has advanced to a certain state, the adjoining sound bones, both above and below the seat of disease, become approximated to each other, and, at length, anchylosed. This salutary process, if influenced at all by mechanically supporting the spine, must obviously be retarded. From this account, we also see the reason, why the projection of the spinous processes, at least, in adult subjects, must always remain. In children, however, a great diminution, and, I might add, an entire removal, of a certain degree of deformity, may take place, during the growth of the body.

Every surgeon should peruse the excellent account of the present disease, published by Mr. Pott, to whom I am indebted for the most valuable of the preceding observations.

CHAP. LXXII.

AMPUTATION.

CASES sometimes present themselves, in which the certainty of death authorizes such treatment, as too often leaves only a probability of life. Such are, in general, all those external diseases, which, placing the patient betwixt the danger of his condition, and the risk of a great operation, leave him no other resource, but that of exposing himself to the latter, in order to avoid the former. Of this sort, in particular, are those cases, in which the preservation of life depends upon the removal of a limb. But, here, more than in any other case, the wise surgeon will be slow in resorting to this means. Amputation is an extreme measure, that has often an unfortunate result; and, as success itself is only obtainable by a terrible sacrifice, we are bound by every principle of surgery and humanity never to practise the operation, before every other possible means of relief has been fairly tried, and found to be ineffectual. Here the conduct of a surgeon, who, in his eagerness to do good, prematurely employs the knife, deserves, on every account, to be reprobated, in the language of the immortal Bichat, as generally murderous.*

AMPUTATION OF THE THIGH.

The thigh should be amputated as low as the disease will allow. The patient is to be placed on a firm table, with his back properly supported by pillows, and assistants, who are also to hold his hands, and keep him from moving too much during the operation. The ankle of the sound limb is to be fastened, by means of a garter, to the nearest leg of the table.

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* "L'art est ici presque toujours meurtrier, quand il veut trop tôt devenir salutaire." Œuvres Chir. de Desault, tom. 2, p. 581.

The first thing is the application of the tourniquet. The pad of this instrument should be placed exactly over the femoral artery, in as high a situation, as can conveniently be done. When the thigh is to be amputated very far up, an assistant is to compress the femoral artery in the groin by any commodious instrument, having a round, blunt end, adapted for making direct pressure on the vessel, without injuring the integuments.

Perhaps, however, the latter method should only be adopted when the operation is to be done so high up, that the tourniquet would absolutely be in the way of the incisions. It is generally acknowledged, that some disadvantage results from the application of the tourniquet to a thigh, on which amputation is practised. Yet, it is by no means advisable to prefer, in ordinary cases, compression of the femoral artery in the groin by an assistant. Putting out of present consideration, his being liable to fail in commanding the flow of blood through the artery, we are to remember, that besides this vessel, there are others concerned in supplying the thigh with blood; as, for instance, the obturatoria, the iliaca posterior, or glutea, and the ischiadica. Hence, pressure upon the femoral artery in the groin can never stop the bleeding, but incompletely; and I leave it to every man of experience to contemplate, how many cases there are, in which not a drop of blood should be unnecessarily spilt. I would even urge, that, in numerous instances, in which the patient is much reduced at the time of submitting to the operation, any considerable hemorrhage must be regarded as a fatal occurrence. A tourniquet, made on the principle of a truss, would also have no effect in checking the bleeding from such arterial branches, as emerge from the apertures of the pelvis. Unless, therefore, the height of the requisite incisions absolutely leaves no room for the instrument, the use of the common tourniquet should not be relinquished: it makes pressure on the whole circumference of the limb; it can be tightened, or loosened, with the greatest celerity, as circumstances may require; and it operates without risk of displacement. On the other hand, it has the inconvenience of opposing the full retraction of the superficial loose muscles, before those more fixed to the bone are cut; but, I must still think with Pelletan, that it is an inconvenience, to which we ought to submit.*

The operator is to stand on the right side of the patient, whether the right or left limb is to be removed. By this means, he acquires the advantage of always having his left hand next the wound, so as to be of very essential assistance. This advantage more than counterbalances the inconvenience of having the right limb in the way of the operator, when the left thigh is the one to be amputated.

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* See Clinique Chir, tom. 3, p. 230.

An assistant, firmly grasping the thigh with both hands, is to draw upward the skin and muscles, while the surgeon makes a circular incision, as quickly as possible, through the integuments, down to the muscles. The cellular substance, connecting the skin, immediately above this wound, with the fascia, is next to be divided all round the limb, till as much skin can be drawn back, as will afterwards, conjointly with the muscles cut, in a mode about to be described, cover the surface of the wound with the utmost facility.

The ancient surgeons used to cut directly down to the bone at once, and the frequent consequence was, that the stump was a very conical, or sugar-loaf, one, extremely unfit for bearing any degree of pressure, and, therefore, kept healed with difficulty. The end of the bone, in fact, was very often seen protruding beyond the soft parts. Hence, the *double incision*, as it was termed, was eagerly adopted by surgical practitioners. In this method, the skin is cut, in the way already explained, and then the operator proceeds to the division of the muscles.

But, notwithstanding the double incision, the protrusion of the bone sometimes occurred.

M. Louis, a surgeon, for whose memory every admirer of science ought to entertain the most profound veneration, was the first, who discerned the cause of this occurrence, and the method of preventing it. He observed, that the muscles of the thigh became retracted in an unequal manner, when divided; those which are superficial, and extend along the limb, more or less obliquely, without being attached to the bone, becoming retracted with greater force, than others, which are deep, and, in some measure, parallel to the axis of the femur, and fixed to this bone throughout its whole length. Their retraction begins at the moment of the operation, and, for some time afterwards, continues unfinished. Hence, the effect should be promoted, and be as complete as possible, before the bone is sawn. With this view, M. Louis practised another kind of double incision; by the first, he cut, at the same time, both the integuments, and the loose superficial muscles; by the second, he divided those muscles, which are deep, and closely connected with the femur. On the first deep, circular, cut being completed, M. Louis used to remove a band, which was round the limb above the track of the knife, in order to allow the divided muscles to become retracted without any impediment, and he then cut the deep muscles, on a level with the surface of those, which had been divided at first, and which were now in a retracted state. In this way, he could evidently saw the bone very high up, and the painful dissection of the skin from the muscles was avoided. I have always thought the reasoning of this eminent practitioner very strong, and his practice deserving of a more extensive trial, than I believe it has obtained in this country. However, as my limits will not allow me to introduce, into this work, his truly interesting observations on this subject, the reader must consult them himself.*

Mr. Alanson's mode of amputating is what still prevails in this country. The integuments being divided by a circular wound, the knife is to be applied to the inner edge of the vastus internus, and, at one stroke, an incision is to be made obliquely through the muscles, upward in respect to the limb, and down to the bone: in other words, cut in such a direction as to lay the bone bare, about two or three fingers breadth higher, than a perpendicular circular incision would do. Now draw the knife towards you, so that its point may rest upon the bone, still observing to keep the instrument in the same oblique position, in order that the muscles may be divided all round the limb in that direction, by a proper turn of the knife. During the performance of this movement, the point of the knife is to be kept in contact with the bone, round which it of course must revolve.†

I am happy to remark, that many excellent surgeons, whom I have seen operate, do not cut at once obliquely down to the bone, after the integuments have been separated; but so far adopt the principles of M. Louis, as to divide the loose muscles first, and lastly, those which are intimately attached to the bone, throughout their whole extent. This is certainly a better mode of operating, than that, in which Mr. Alanson's directions are precisely followed. However, I am obliged to state, that the attempt to divide the loose muscles first, and then the more fixed ones, is very apt to make a surgeon cut the whole, or a great part of the same muscle through more than once; a fault in modern practice, which, as far as my judgment extends, deserves reprobation, as much as any proceeding, which can be instanced. To say how unnecessary it is to divide any muscle more than once, is as needless as to remind the reader of its doubling the agony of a most severe operation.

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* See Mémoire sur la saillie de l'os après l'Amputation des membres; ou l'on examine les causes de cet inconvénient, les moyens d'y remédier, et ceux de la prévenir. Also, Second Mémoire sur l'Amputation des Membres, *Mém. de l'Acad. de Chirurgie, tom.* 5, p. 244, *and* 401, *edit. in* 12mo. Likewise, Nouvelles Observations sur la Rétraction des Muscles après l'Amputation de la Cuisse, et sur les moyens de la prévenir. *Op. cit. tom* 11, *p.* 63, *edit. in* 12mo.

† See Alanson's Practical Observations on Amputation.

Having cut completely down to the bone, a piece of linen, somewhat broader than the stump, should be torn at one end, in its middle part, to the extent of about eight, or ten inches. This is called a retractor, and is applied by placing the exposed part of the bone in the slit, and drawing the ends of the linen upward on each side of the stump. Thus the retractor will evidently keep every part of the surface of the wound out of the way of the saw. I have seen the saw do so much mischief, in consequence of neglecting to use the retractor, that my conscience obliges me to censure such surgeons as are in the habit of employing the saw, without defending the soft parts by this simple contrivance. I think no one can say, that the retractor can do harm; and I know, that many who have been with myself eye-witnesses of the mischief frequently done by the saw in amputations, are deeply impressed with an aversion to the neglect of this bandage. I have often seen the soft parts adroitly divided; and I have, in these same instances, seen the operators directly afterwards lose all the praise, which every one was ready to bestow, by their literally sawing through one half of the ends of the muscles, together with the bone. But, besides defending the surface of the stump from the teeth of the saw, the retractor will undoubtedly enable the operator to saw the bone higher up, than he otherwise could do.

Another proceeding, which seems to be fit for reprobation, is the practice of scraping up the periosteum with the knife, as far as the muscles will allow. I think this plan may sometimes be the cause of the exfoliations, which happen after amputations. At all events, it is a superfluous, useless measure, as a sharp saw, such as ought to be employed, will never be impeded by so slender a membrane as the periosteum. All that the operator ought to do, is to take care to cut completely down to the bone, all round its circumference. Thus a circular division of the periosteum will be made, and, on this precise situation, the saw should be placed.

If the bone should happen to break, before the sawing is finished, the sharp projecting spiculæ, thus occasioned, must be removed by means of an instrument, called bone-nippers.

After the removal of the limb, the femoral artery is to be taken hold of with a pair of forceps, and tied, without including the accompanying branches of the anterior crural nerve in the ligature. None of the surrounding flesh ought to be tied, though the ligature should undoubtedly be placed round the artery, just where this vessel emerges from its lateral connexions. The other arteries are usually taken up with a tenaculum. After tying as many vessels as require it, one half of each ligature is to be cut off near the surface of the stump.

Mr. Alanson judiciously directs, that, when the large vessels are tied, the tourniquet should immediately be slackened, and the wound well cleaned, in order to detect any vessel, that might otherwise lie concealed with its orifice blocked up by coagulated blood; and, before the wound is dressed, its whole surface should be examined with the greatest accuracy. By this means, a pulsation may often be discerned, where no hemorrhage has previously appeared, and a small clot of blood may be removed from the mouth of a considerable artery.

The whole surface of the wound should always be well cleaned with a soft sponge, and warm water, as the lodgment of much coagulated blood would undoubtedly be unfavourable to the speedy union of the wound.

The skin and muscles are now to be placed over the bone, in such a direction, that the wound shall appear only as a line, across the face of the stump, with the angles at each side, from which points, the ligatures are to be left out, as their vicinity to either angle directs. The skin is now commonly supported in this position, by long strips of adhesive plaster, applied from below upwards, across the face of the stump. Over these, and the ends of the ligatures, it is best to place some pieces of lint, spread with the unguent. sperm. cet., to keep them from sticking, which becomes an exceedingly troublesome circumstance, when the dressings are to be removed. I am decidedly averse to the general plan of loading the stump with a large mass of plasters, pledgets, compresses, flannels, &c. I see no reason, why the strips of adhesive plaster, and a pledget of simple ointment, should not suffice, when supported by two cross bandages and a common linen roller, applied in a spiral way round the limb, from above downward. The first turn of the roller, indeed, should go round the patient's body. Two cross bandages are to be put over the end of the stump.

I conceive, that the elastic woollen cap, commonly placed over all the bandages and dressings, if not put on with a great deal of care, has a tendency to push the skin backward from the extremity of the stump, and, as it must also heat the part very much, I think its employment might very properly be discontinued.

After the operation the stump should rest upon a pillow of very moderate thickness; for, bending the thigh bone too much causes a retraction of the flexor muscles.

If possible, the dressings should never be removed before the third day; but, in general, it is quite soon enough to change them on the fourth.

At the end of five or six days, the surgeon may begin to try, in a very gentle manner, whether any of the ligatures are loose. However, he should not use the smallest force, nor persist, if the trial should create pain. One would hardly try, whether the ligature on the great artery is loose before the eighth or ninth day.

AMPUTATION BELOW THE KNEE.

In the thigh, we amputate as low as the nature of the case will allow us. In the leg, the common practice is always to make the incision through the integuments sufficiently low, to enable the operator to saw the bones, about four inches below the lower part of the patella. This is necessary, in order not to deprive the stump of that power of motion, which arises from the flexor tendons of the leg continuing undivided.

The tourniquet should be applied to the femoral artery, two thirds of the way down the thigh, just before the vessel perforates the tendon of the triceps muscle. This is a much more convenient situation, than the ham. The leg being properly held, the integuments should next be drawn upward by an assistant, while the surgeon, with one quick stroke of the knife, must divide the skin completely round the limb. Some recommend the operator to stand on the inside of the leg, in order to be able to saw both bones at once. No reflections could ever make me perceive, that any real advantage ought strictly to be imputed to this plan. I know, that many think it diminishes the chance of the fibula being splintered, as this bone is completely divided rather before the tibia. But, splintering the bones arises from the assistant, who holds the leg, depressing the limb too much: it would be difficult to explain, why the two bones should not be splintered, when a certain thickness of them has been sawn through, if the leg were too forcibly depressed.

Having made a circular division of the integuments, the next object is, to preserve skin enough to cover the front of the tibia and the part of the stump, corresponding to the situation of the tibialis anticus, extensor longus pollicis, and other muscles, between the tibia and fibula, including those covering the latter bone. Throughout this extent, there are no bulky muscles, which can be made very serviceable in covering the end of the stump, and the operator must consequently save sufficient skin in this situation, by dissecting it from the parts beneath, and turning it backward.

On the posterior part of the leg, on the contrary, the skin should never be detached from the large gastrocnemius muscle, which, with the soleus, will here form a sufficient mass for covering the stump. Hence, as soon as the skin has been separated in front, and on the outside of the leg, the surgeon is to place the edge of the knife in the incision of the integuments, and cut directly through the muscles of the calf, from the inside of the tibia, quite to the fibula. Then the flap, formed by the calf of the leg, is to be held back by the assistant, while the surgeon completes the division of the rest of the muscles, together with the interosseous ligament, by means of the catling, a kind of long, narrow, double-edged knife.

In amputating below the knee, very particular care must be taken to cut every fasciculus of muscular fibres, before the saw is used. Every part being divided, except the bones, the soft parts are next to be protected from the saw, by a linen retractor, made with three tails, one of which is to be drawn through the space, between the tibia and fibula.

In the leg, there are only three principal arteries, requiring a ligature, viz. the anterior and posterior tibial, and the peroneal arteries.

AMPUTATION OF THE ARM.

As M. Sabatier remarks, the structure of the arm bears a great analogy to that of the thigh. There is only one bone, round which the muscles are arranged, the deep ones being adherent to the os brachii, while the outer ones extend along the limb, without being attached to this bone. The first are the brachialis internus, and the two short heads of the triceps; the others are, the long portion of the latter muscle, and the biceps. Hence amputation, in this situation, is performed, in a very similar manner, to the same operation on the thigh, unless it be necessary to remove the limb above the insertion of the deltoid muscle.*

The patient may either sit on a chair, or lie near the edge of a bed, and an assistant is to hold the arm in a horizontal position, if the state of the limb will allow it. The pad of the tourniquet is to be applied to the brachial artery, as high as convenient. The assistant is then to draw up the integuments, while the surgeon makes the first circular incision. In this operation, the skin need only be detached from the muscles to a very trivial extent, as there is no fear of not having sufficient flesh and integuments to cover the bone. When the muscles, in front of the arm, are divided, the elbow should, if possible, be bent by the assistant, who holds the arm, and, if the joint were quite moveable, the limb might be placed in a straight posture, when the division of the triceps is to be effected. It is best to divide the biceps first, and after the retraction of this loose muscle, to cut the brachialis internus, which is fixed to the bone, by an incision sloping obliquely upward.

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* Médecine Opératoire, tom. 3, p. 242.

However, the triceps may be cut through at once, by one sweep of the knife, with its edge inclined obliquely upward. The rest of the proceedings do not require description after the account already given of what is necessary in amputating the thigh.

When it becomes indispensable to amputate the arm at a very high situation, there is no room for the application of the tourniquet. In this instance, the artery is to be firmly compressed, as it passes over the first rib, by an assistant, who can most effectually accomplish this important object, by pressing a pad on the vessel with the handle of such an instrument as a key of suitable size. This may be done from above the clavicle, or, perhaps, equally well, at the interspace, between the margins of the pectoral, and deltoid muscles, below this bone. The great particularity, in operating very high, is raising the deltoid muscle, after first making an incision corresponding to its margin in shape and situation. Then the muscle is to be detached from the bone beneath, so as to form a flap, which is to be turned up. The operation is then to be finished in the ordinary manner.

AMPUTATION OF THE FOREARM.

The forearm is to be amputated as low as the case will allow. The tourniquet is to be applied a little above the condyles of the humerus, with its pad on the brachial artery, at the inner edge of the biceps muscle. While one assistant holds the hand, another is to take hold of the forearm, above the place where the first circular wound is to be made. Thus, in conjunction with the person who has charge of the hand, he will fix the limb in a proper manner, and at the same time, can draw up the integuments. The skin is to be detached from the fascia, a little way upward, after the amputating knife has been carried round the limb. The muscles are then to be divided with the common knife, as long as this will do what is to be done with convenience, and the catling is afterwards to be employed for completing the division of the soft parts, situated between the radius and ulna. The retractor is to be applied, and the bones sawn, with the hand in the state of pronation.

There are, in general, only four arteries to be tied, viz. the radial, ulnar, and two interosseous ones.

AMPUTATION AT THE SHOULDER JOINT.

I do not deem it necessary, in this introductory work, to occupy the reader's time with a detail of every mode of doing this operation, proposed, or practised, since the time of Le Dran. My intention is only to mention the method, which, I believe, the generality of the best modern surgeons prefer.

The loss of blood is to be prevented, by compressing the axillary artery, in the way mentioned in the account of the amputation of the arm in a high situation. With a large common bistoury, a semicircular incision is to be made, with its convexity downward, across the integuments covering the deltoid muscle, about four inches below the acromion.* The skin is not to be detached; but, the surgeon is to proceed immediately to raise the muscle from the bone, quite up to the joint. If the circumflex arteries should bleed much, they are now to be tied, before the operator proceeds further. Then the surgeon should cut the tendons passing over the joint, and, also, the capsular ligament, so as to be enabled to dislocate the head of the bone from the glenoid cavity of the scapula. Having proceeded thus far, he is to take an amputating knife, and, with one stroke, divide the skin and other parts underneath the joint, so as to complete the operation. The mouth of the axillary artery should be instantly taken hold of with the fingers, and tied as soon as possible.

The flap of the deltoid muscle is next to be laid down, and its edge will then meet the margin of the wound below.

This mode of operating was first proposed by M. De La Faye.

Sinuses, very difficult to heal, and discharging a thin fluid, are not unfrequent after this operation. They were ascribed by Alanson to the slowness, with which the cartilage of the glenoid cavity exfoliates. In some instances, in which the excision of this cartilage was performed, the patients soon recovered; while, in certain other cases, in which this measure was neglected, incurable fistulæ afflicted the patients for many months after the amputation.†

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* The horns of the semicircle, if I may use the expression, are to extend upward along the anterior and posterior margin of the deltoid muscle.

† See London Medical Review, vol. 4, p. 94.

As I have explained in the chapter on gun-shot wounds, the necessity for amputation at the shoulder joint may often be removed, and the limb be preserved, by the performance of a more simple and less mutilating operation. This consists in merely making an incision for the extraction of the diseased, or splintered head of the humerus, and, if necessary, of the adjoining part of the scapula. The arm is afterwards to be properly supported in a sling, so as to keep the upper end of the humerus as far upward as possible. It was in an example, where the head of the humerus was diseased, that this judicious practice was first adopted by Mr. Charles White,* of Manchester; and M. Larrey has, in not less than ten instances of gun-shot wounds, superseded the necessity of amputating at the shoulder by the complete and immediate extraction of the head of the humerus, and of the splinters.†

AMPUTATION OF THE FINGERS AND TOES.

The removal of a toe, or finger, though easy of accomplishment to a skilful surgeon, may make another one, who is not aware of the proper method of operating, appear exceedingly awkward. A small semilunar incision is to be made on the back of the finger or toe, to be amputated. This wound must extend across the part, and its greatest convexity be about half an inch in front of the joint, into which the surgeon intends to cut. The little flap is next to be raised, and reflected. Next, the skin, in front of the finger, and immediately over the joint, is to be divided, so that this second cut must extend across the finger, or toe, and meet the two ends of the first semilunar incision. The joint is now to be bent, and the capsular ligament opened. If the surgeon were to attempt to cut into the joint, with the finger, or toe, in a straight position, he might try a considerable time before he would succeed. Things being accomplished so far, the next object is to divide one of the lateral ligaments, which, after an opening is made into the capsular ligament, may be most easily effected. This allows the head of the bone to be dislocated, and the surgeon has nothing more to do, than to cut such other parts, as still attach the part, about to be removed, to the rest of the limb. When the arteries bleed much, they must be tied; but, it frequently happens, that the hemorrhage will stop without a ligature, as soon as the flap is applied to the end of the stump, and the adhesive plaster has brought the edges of the wound accurately together.

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* See his Cases in Surgery.

† Relation Chirurgicale de l'Expedition de l'Armée d'Orient en Egypte, &c. p. 315.

Some surgeons consider it quite unnecessary to make any semicircular flap of the skin; and prefer drawing the integuments a little up, and then dividing them in a circular manner. By this mode, no doubt, quite enough skin may be preserved for covering the end of the bone.

When it is necessary to remove the metatarsal bone of the great, or little, toe, it is better to saw off the diseased portion, than to cut into the joints of the tarsus. Sufficient skin should be saved for covering the wound, and, when the saw is used, the adjoining soft parts must be defended from injury by a piece of pasteboard, placed between them and the teeth of the instrument.

When the thumb is to be amputated, a flap is, also, to be preserved for covering the end of the stump.

CHAP. LXXIII.

PARONYCHIA, OR WHITLOW.

A WHITLOW is a very painful, inflammatory swelling, about the extremity of the finger, or at the root, or sides of the nail, and it is remarkably prone to suppurate. Authors describe different sorts of whitlows. Only four seem to merit distinction, and these chiefly differ from one another, merely in regard to the depth of the situation, which they occupy.

The first is situated under the cuticle, and begins at the corner of the nail, in the form of a little tumor, which spreads all round. When matter is collected, it may be discharged, by cutting the cuticle with a pair of scissars; a thing, which may be accomplished without the slightest pain. Sometimes, the natural connections of the root of the nail are destroyed, and this part separates to make way for a new nail, which nature produces.

In the second species, an unpleasant sensation of heat is experienced at the extremity of the finger, for some days; the part becomes gradually more tender and painful; it swells, but the skin is not discoloured; and, if the inflammation should not end in resolution, a thin matter collects between the skin and subjacent parts. On this fluid being evacuated by an incision, immediate relief is generally obtained.

The third kind of whitlow is situated in the theca of the flexor tendons of the fingers. When the inflammation continues beyond a certain period, the suppuration, sometimes, becomes palpable about the joints, and even in the hand, by a fluctuation, which is not distinguishable over the phalanges, on account of the dense, firm structure of the tendinous sheath.

The fourth kind of whitlow extends to the periosteum and bone. The complaint is attended with an acute, deep-seated pain, and a swelling, which is more confined to the phalanx affected, than the tumefaction accompanying other whitlows. On an incision being made to discharge the fluid, this is found lodged beneath the periosteum, while the bone is, also, for the most part, discovered to be rough and carious.

When whitlows are very severe, the throbbing of the arteries extends, for a considerable distance, up the arm, and the febrile symptoms run high.

Whitlows often originate from external causes, such as bruises, pricks, &c. but, in general, we find, that the complaint occurs, without being preceded by any assignable cause whatever.

TREATMENT.

Topical applications of two very opposite classes have been recommended, viz. fomentations, poultices, and all sorts of emollient remedies; and vinegar, spirits, and astringent applications in general.

Excepting the first case of whitlow, the formation of matter seems to be productive of no relief, and experience evinces, that there is no advantage in promoting the event. It is even certain, that the pain is increased by the accumulation of fluid. When matter is already collected, no benefit whatever is ever derived from emollients, especially, when the whitlow is deep; for, then the fluid never partakes of the nature of the pus. Hence, the best practice consists in preventing a collection of fluid from taking place by applying leeches and topical astringents to the part, and using antiphlogistic means. In very violent cases, in which the swelling extends as far as the arm, and the fever is considerable, venesection should be practised, and opium exhibited.

Brandy, spirit of wine, and vinegar, are as good topical applications as any, which can be mentioned.

Let it be remembered, however, that such treatment is only proper for preventing matter from accumulating, and that, when fluid is already collected, the indication is to make an immediate opening for its discharge. The incision should always be sufficiently large to allow the matter to escape in a ready manner. The surgeon should not wait for whitlows to point; the matter would spread very extensively within the tendinous thecæ, and soon induce a carious affection of the bones, if the practitioner were imprudently to wait for a pointing to occur. On an opening being made into the collection of fluid, a director should be introduced, and the wound enlarged by cutting upon this instrument. A simple pledget will be a better dressing, than poultices.

When there is only one phalanx in a carious state, and when this one bone is much diseased, some practitioners deem it more advisable to enlarge the wound sufficiently to allow the part to be dissected out, than to wait for the completion of tedious exfoliations.

CHAP. LXXIV.

VENESECTION; OCCASIONAL ILL-CONSEQUENCES OF THIS OPERATION.

IN whatever part of the body venesection is to be practised, it is necessary to make pressure on the vein, betwixt the place, where the puncture is to be made, and the heart. Thus the return of blood through the vessel is prevented, consequently, it swells, becomes conspicuous, and bleeds freely, which it would not do, if the blood could readily pass on towards the heart.

In bleeding in the arm, a fillet, or bandage, is to be tied, with moderate tightness, round the arm, a little above the elbow. The design of doing this is, to intercept the passage of the blood through all the superficial veins, without obstructing the circulation through the artery, as in this circumstance, the veins evidently could not be rendered turgid.

The surgeon, before putting a ligature round the arm, should always feel where the pulsation of the artery is situated, and, if equally convenient, he should not open the vein immediately over this part. It is also proper to examine where a pulsation is situated, on account of the occasional varieties in the distribution of the arteries of the arm. The ulnar artery is sometimes given off from the brachial high up, and, in this case, it frequently proceeds superficially over the muscles, arising from the internal condyle, instead of diving under them, in the ordinary manner.

In general, it is best to select a vein, which rolls least under the skin. Such a vessel, though sometimes not so superficial as another, may commonly be more easily opened, than the latter. However, the operator is always to fix the vein, as much as he can, by placing the thumb of his left hand a little below the place, where he intends to introduce the lancet.

More depends on the mode of using this instrument, than on its shape. It should be pushed into the vein in an oblique direction, and, when its point is a little within the cavity of the vessel, it is not to be introduced further, but the opening is to be rendered sufficiently large by carrying the front edge of the lancet obliquely forward and upward, by which movement, it is also brought out of the part again. In cases of herniæ, it is often a great desideratum to make a free opening, in order that the sudden evacuation of blood may make the patient faint. The puncture being made, the patient is to support his arm, in a convenient position for allowing the blood to flow into a basin, by taking hold of a stick, which he may turn round and round in his hand, in order to put the muscles into action, and make the blood flow out in a freer current. Sometimes, however, it escapes so readily, that there is no occasion to move the muscles of the arm. When the patient is so circumstanced, that he cannot take hold of a stick, the surgeon is to support the arm in a convenient posture; and, if the vein should not bleed in a free manner, he is to desire the patient to take hold of any small body, and move it about in his hand, in order to put the muscles of the forearm into action.

The due quantity of blood having been taken away, the ligature is to be loosened, and removed. The current of blood now generally ceases, and always does so, when the surgeon places the thumb of his left hand just below the orifice. The arm in this state is to be washed with a sponge, and dried. The edges of the wound are to be placed in contact, and kept so by a small compress of lint, which is to be bound on the part, by applying the bleeding fillet round the arm, in the form of a figure of eight. The bandage is to meet and cross in front, exactly over the dossil of lint.

When the external jugular vein is opened, the surgeon generally makes the necessary pressure with his thumb. The orifice should be made in the direction of the fibres of the platysma myoides muscle, and the vein is not so apt to glide out of the way, when the surgeon opens the vessel, just where it lies over some part of the sterno-cleido-mastoideus.

The temporal artery, and its branches, are the only vessels, in which surgeons now ever perform arteriotomy. When the branch seems to be superficial, it may be punctured at once; but, in other cases, it is best to make first a small incision through the integuments. After the due quantity of blood has been taken away, the bleeding may always be stopped, by means of a roller and compress. When there is much hemorrhage after the operation, some surgeons recommend cutting the vessel completely across, in orde to allow it to become retracted.

OCCASIONAL ILL CONSEQUENCES OF BLEEDING IN THE ARM.

Ecchymosis.

The most common troublesome occurrence, after bleeding, as far as my observation extends, is a swelling, which originates from blood insinuating itself, from the orifice of the vein, into the adjacent cellular substance. Sometimes, this *ecchymosis*, as it is technically named, forms a tumor as large as, or even larger, than a walnut. The blood is mostly absorbed, in the course of a week, or ten days; and this desirable event should be promoted by applying lotions of vinegar, sal ammoniac, &c. In some instances, the tumor suppurates; and it becomes necessary to apply poultices.

INFLAMMATION OF THE INTEGUMENTS, AND CELLULAR SUBSTANCE.

This very often occurs, when the patient neglects to keep his arm quietly in a sling, for a day, or two, after the operation. The improper motion of the limb makes the edges of the wound rub against each other, and they necessarily inflame, and even suppurate. The inflammation and suppuration are apt to be communicated to the surrounding skin and cellular substance, for a greater, or less extent.

This case requires the same treatment, as other phlegmonous tumors.

In persons, who lead intemperate lives, the inflammation is very often of the erysipelatous kind.

INFLAMMATION OF THE ABSORBENTS.

These vessels, we know, are susceptible of inflammation, as well as other parts. We frequently feel them extending from a part, in which there is some species of local irritation, like firm cords, of much greater thickness, than one can suppose would arise merely from the swollen coats of these delicate vessels.

The fact is, the adjoining cellular substance is also affected, and contributes to the swelling. The inflamed absorbents may sometimes be seen running from the wound, in the form of reddish streaks; and if this appearance should extend, both towards the thoracic duct, and also in a direction from it, we may conclude, that the affection is in consequence of irritation, and not of absorption. After bleeding, they are found occasionally running upward to a glandular swelling, situated about the middle of the arm, in the course of the large vessels, and to another glandular tumor, situated over the muscles of the forearm, which arise from the internal condyle. The treatment of this sort of case is entirely antiphlogistic.

INFLAMMATION OF THE VEIN.

Another occasional ill-consequence of venesection is an inflammation of the vein. This affection may differ in degree and extent, as well as in its progress. One degree of inflammation may only occasion a slight thickening of the venal tube, and an adhesion of its sides; a more violent degree may produce abscesses, the matter of which may sometimes become blended with the circulating fluids, and produce dangerous consequences; or it may be circumscribed by the thickening and adhesion of the surrounding parts, and, like a common abscess, make its way to the surface. A good deal of sympathetic fever is likely to attend an extensive inflammation of the vein; and this affection, it is thought, may possibly become continued along the cuticular coat of the vessel to the heart.

If, however, an adhesion of the sides of the vein to each other should be occasioned, a little way from the wound, the expansion of the inflammation will be stopped at the place, where the vessel has been rendered impervious. In one instance, Mr. Hunter employed compression, and he imagined, that he thus limited the extent of the inflammation, by producing an adhesion of the above kind.* The affection sometimes spreads in the direction from the heart.

The treatment should consist in attempting to diminish the inflammation by the usual antiphlogistic means, and, in applying a compress at some distance from the puncture, in order to produce an adhesion of the sides of the vein, and thus remove the danger, which would result from the spreading of the inflammation, along the lining of the vessel, towards the heart.

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* Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge, vol. 1, p. 29.

INFLAMMATION OF THE FASCIA OF THE FOREARM.

This is an event, which sometimes follows venesection. The arm cannot be moved, without pain and difficulty. The whole forearm is tender, when compressed, though the integuments are scarcely at all affected. There is generally a great deal of uneasiness in the axilla, and the affection is attended with sympathetic fever. After suppuration has occurred, the matter does not readily point. The treatment should be antiphlogistic, in every sense of the word. Leeches should be applied; the patient purged, the arm covered with the saturnine lotion; and kept at rest in a sling. When matter is known to have collected, an early depending opening ought to be made, and the arm should be gently compressed with a roller.

Mr. Abernethy, in his ingenious essay on this subject, seems to be of opinion, that the contracted state of the forearm, sometimes following inflammation of the fascia, might be cured by dividing the portion of fascia, sent off, at the bend of the elbow, from the tendon of the biceps muscle.

ILL CONSEQUENCES OF A WOUND OF A NERVE.

The above gentleman informs us, that Mr. Pott, in his lectures, used to mention cases, in which patients had suffered distracting pain, followed by convulsions, and other symptoms, which could only be ascribed to nervous irritation. Mr. Abernethy has treated this subject with much discrimination; he explains, what nerves are exposed to injury; what are the effects likely to be produced by such an accident; and what means are most likely to afford relief.

The two cutaneous nerves are most in the way of the lancet. Most frequently, all their branches pass beneath the veins at the bend of the arm; but, sometimes, many small filaments are detached from these branches, and proceed over the vessels. The above eminent surgeon remarks, that when a nerve is irritated at any part, between its origin and termination, a sensation is felt, as if some injury were done to the parts, which it supplies. Hence, when the cutaneous nerves are injured, the integuments of the forearm will seem to suffer pain.

It seems highly probable, that some symptoms, consequent to venesection, in certain instances, have been unfoundedly imputed to the irritation of a nerve, arising from its partial division. As Mr. Abernethy observes, in the many operations, which are performed, and in wounds of daily occurrence, it would be strange, if a partial division of a nerve should not happen; yet, no peculiar symptoms usually ensue.

The practice of completing the division of the nerve, supposed to be injured, is very questionable, in regard to the utility which it presents. However, if the surgeon should think the plan justifiable, a transverse incision may be made above the orifice of the vein. This wound, as Mr. Abernethy remarks, need not be extensive, for the injured nerve must lie within the limits of the original orifice, and there is no occasion for the cut to descend more deeply than the fascia, as all the filaments of the cutaneous nerves lie above this part.

I cannot do better, in concluding this subject, than refer the reader to Mr. Abernethy's instructive essay.*

The consideration of the several ill consequences, occasionally resulting from phlebotomy, is closely connected with the subject of all other wounds, which are followed by extraordinary symptoms.

CHAP. LXXV.

PARTICULAR FRACTURES.

FRACTURE OF THE OSSA NASI.

THE lower portion of these bones is most subject to be broken by external violence. The two ossa nasi are not always broken together; sometimes one is fractured all across, while the other, without having suffered any solution of continuity, is either elevated or depressed. These cases are often attended with a fracture of the perpendicular lamella of the os ethmoides, which process, in this circumstance, always becomes distorted to one side, and may be easily moved with the little finger, or a probe. Such accidents are commonly accompanied by inflammation of the pituitary membrane, swelling of the whole nose and face, ophthalmy, a great deal of hemorrhage from the nostrils, obstructed respiration, nay, the blow, which has broken the ossa nasi, may also have produced a concussion of the brain; an extravasation of blood within the cranium; or pressure on the brain, from the crista galli being actually driven inward.

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* See his Surgical Works, vol. 2, p. 133, &c.

Unless the tumefaction be very considerable, the diagnosis of a fracture of the ossa nasi is too obvious to need any detail.

TREATMENT.

The displaced portions of bone are to be raised, or depressed, to their proper level, by introducing a probe, rolled round with lint, to the upper part of the nostril, and moving the pieces of bone into their proper position, by means of the conjoint operation of the probe on the inside, and of the fingers on the outside, of the fracture. If the perpendicular process of the os ethmoides should be beaten to one side, it is to be replaced, as well as circumstances will allow, with the aid of a probe. If there should be reason to conjecture, that the crista galli is driven inward, and compresses the brain, the surgeon, after elevating the bony arch, formed by the ossa nasi, should gently endeavour to draw down the perpendicular lamella of the ethmoid bone.

The ossa nasi, when replaced, are not at all liable to be drawn out of their proper situation by the action of muscles. However, if the broken pieces should have a propensity to fall inward, they must be supported by dossils of lint, smeared with any softening ointment, and introduced under the fracture, Most writers recommend tubes, of a proper shape, to be placed in the nostrils, in order to support the broken portions of bone; but, I believe, that few modern practical surgeons would think these instruments necessary.

FRACTURES OF THE LOWER JAW BONE.

This bone is liable to be broken, either in its body, or rami; either on one side, or both; it may also be fractured near its symphysis; and the injuries may, in some instances, be only mere solutions of continuity; while, in others, they may be comminuted fractures, that is, cases in which the bone is broken into several pieces. Fractures of the lower jaw are usually not at all displaced, when these injuries occur near the angle of the bone; for, then, the pterygoid, temporal, and masseter, muscles, retaining the posterior part, the digastric, and other muscles, cannot draw downward the body of the bone.

A fracture of the lower jaw may be detected by introducing a finger into the mouth, and pressing on the front teeth of the side on which the fracture is supposed to be, while, at the same time, the fingers of the other hand are applied to the basis of the bone, near the angle. On making alternate pressure in each of the above situations, the bone may be felt to move, or even a crepitus may be distinguished. When the fracture is displaced, the diagnosis is still more easy. In this case, the body of the bone is drawn downward from the ramus; the mouth is more or less open, and drawn to one side, in such a manner, that the commissure of the lips is much lower on the side where the fracture is, than on the other; while the front teeth are much below the level of the back ones. When one end of the fracture projects forward, and passes over the other, the mouth is more disfigured on the side, towards the injury; it forms a projection forward, and the teeth are not arranged in a regular, semicircular manner.

TREATMENT.

When the fracture is not displaced, the surgeon need only adapt some pasteboard, wet and softened in vinegar, to the outside of the jaw, both along its side, and under its basis. Over this wet pasteboard, a bandage with four tails is to be applied, the centre being placed on the patient's chin, the two posterior tails pinned to the front part of a night cap, and the two anterior ones attached to a part of the same cap, more backward. When the pasteboard becomes dry, it forms the most convenient thing imaginable for incasing, and supporting the fracture. A piece of soap plaster may now be applied to the skin underneath.

When the anterior part of the bone is lower, than the back portion, the index finger is to be introduced to the base of the coronoid process, which is to be gradually pushed backward, while the index and middle fingers of the other hand are to be applied to the front teeth, and the thumb to the basis of the anterior part of the jaw. At the same moment, that the coronoid process is pushed backward, the front portion of the bone is to be raised. When one end of the fracture is situated over the other, the two parts of the bone are to be pushed in opposite directions, and, on this being skilfully done, the slightest pressure on the extremities of the fracture will suffice for placing them in contact.

When any teeth are driven out of their sockets, they should be immediately introduced again, and, if necessary, tied to the adjoining teeth, by means of a piece of catgut, or gold wire. However, when the displaced tooth belongs to the very situation, at which the fracture has occurred, it is generally thought most advisable to remove it altogether.

The extremities of the fracture having been placed in even contact, the jaw is to be incased in pasteboard, and the four-tailed bandage applied. It will also be necessary to counteract the action of muscles, between the lower jaw and os hyoides, by supporting the front portion of the bone with compresses placed under the bandage.

The artery, running in the canalis mentalis, is often ruptured in these cases, and the hemorrhage is very copious. However, I have never seen a case, in which the bleeding did not cease, on the fractured ends of the bone being placed in a state of apposition.

It is scarcely necessary to observe, that the patient must avoid talking, chewing, or moving the jaw in any way whatsoever. His food should be so soft, as not to require mastication, and it ought to be put into his mouth with a small tea-spoon. In these cases, I am of opinion, that it would be very proper to convey all nourishment into the stomach through a hollow bougie, passed down the œsophagus. This would certainly be preferable to the injection of nourishment, in the form of clysters, as advised in the best surgical books.

FRACTURE OF THE CLAVICLE.

The transverse situation, and the natural slenderness of this bone, render it very liable to be broken, either at its middle, its sternal, or its scapular extremity. Its middle part, however, where its curvature is greatest, is the most frequent situation of a fracture. Fractures of the clavicle are either transverse, or oblique. The diagnosis of the latter cases is most conspicuous, and the ends of the bone, thus fractured, must almost necessarily be displaced; for, the scapular portion is drawn downward by the weight of the arm, and the action of the deltoid muscle, while it is, also, inclined inward by the action of the pectoralis minor, and by the arm approaching the breast. The sternal portion of the clavicle, in the mean time, is not at all altered, in regard to its position. As the bone is hardly covered by any muscles, its fractures are very obvious to the eye and touch. Gently moving the shoulder, and os brachii, renders such injuries still more manifest.

No bad symptoms commonly attend fractures of the clavicle. Emphysema, however, sometimes arises from the lungs being wounded by a spicula of bone, and the subjacent vessels are occasionally injured, or compressed, by the ends of the broken part. Sometimes, an acute extremity of the fracture makes its way through the integuments, and, generally, cannot be reduced, without a dilatation of the wound.

In order to reduce the scapular end of the bone into a proper position, with regard to the sternal portion, which is never in the least displaced, an assistant is to draw the patient's shoulders backward, while another assistant raises the arm, so as both to relax the deltoid muscle, and take off the weight of the limb. Then the surgeon should place the fracture in as even a position as he is able; this being done, a piece of soap plaster is to be applied to the part; a figure-of-eight bandage employed to keep the shoulder backward; and the elbow and forearm kept well supported in a sling. From the account, already given, of the manner, in which a fracture of the clavicle is displaced, it must be sufficiently evident, that compresses, placed on the situation of the injury, cannot possibly do good, and are very likely to do harm, by pressing the scapular end of the fracture downward.

Soft pads should be placed under the margins of the axillæ, to keep them from being chafed, or otherwise irritated by the pressure of the figure-of-eight bandage.

In troublesome cases, it would be proper to keep the arm raised from the side by a suitable pillow, as well as to elevate the shoulder sufficiently to bring the acromion on the side of the injury as high as the corresponding part of the scapula on the opposite shoulder. In such instances, one would also prefer keeping the shoulder backward, by means of a mechanical apparatus with leather straps.

Though I have discouraged the use of compresses, applied above the fracture, it is to be observed, that a skilful surgeon might undoubtedly find them useful in difficult cases, were he to place them judiciously just under the situation of the injury, instead of above it.

I am decidedly of opinion with Desault,* that the figure-of-eight bandage is not altogether well calculated for fractures of the clavicle. The outer portion of the bone is thrown downward and forward, and is already situated too much inward, in which latter direction, the above bandage must push it still more. Hence, the advantage of placing a pillow in the arm-pit, and keeping the elbow closely confined by the side of the body, in the manner advised and practised by the most eminent surgeons of the present day in France.

FRACTURES OF THE SCAPULA.

The greatest part of the scapula, being covered with a good deal of flesh, is not very easily fractured. However, this bone is every now and then broken, either at the body, spine, acromion, coracoid process, neck, glenoid cavity, or at its superior, or inferior angle. Fractures, situated in the body, or spine of the scapula, cannot be much displaced, and are, consequently, most easily cured.

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* See his Œuvres Chirurgicales, par Bichat, tom. 1.

But, when other parts of the bone, especially, its neck, are broken, the fracture becomes displaced, both by the action of the muscles, and by the weight of the arm.

When the body, or spine, of the scapula is fractured, it is unnecessary to do any thing more, than apply a piece of soap plaster to the situation of the injury, together with a spica bandage, and keep the arm of that side perfectly at rest, in a sling. In the treatment of fractures of the acromion, or of the coracoid process, it is indispensably requisite to place the arm in such a position as shall relax the muscles, which are attached to those parts, and cause the fractures to be displaced. Hence, in the first instance, the deltoid muscle is to be kept in a relaxed state by elevating the arm, and maintaining it in this posture by pillows, placed between it and the thorax. A piece of soap plaster, a compress, and the spica bandage, are to be applied, and the limb kept completely quiet. When the coracoid process is fractured, the muscles, connected with it are to be relaxed, by keeping the os brachii advanced forward towards the sternum, bending the elbow, and turning the hand supine. The limb is to be kept in this position by a sling, aided by a roller, if necessary. A piece of soap plaster, a compress, and a spica bandage, will also be necessary. When the neck of the scapula is broken, the glenöid cavity, and os brachii, fall downward, a crepitus is usually felt on raising the limb, and this descends again, immediately it is left unsupported. The evident indications are, to keep the elbow and whole arm properly elevated in a sling, and to forbid all exercise of the limb. A piece of soap plaster, a compress, and a spica bandage, may be applied to the shoulder. The chief dependance must be on the assistance of the sling, in maintaining the arm quiet, and the detached portion of the neck of the scapula, as high as the part, from which it is separated.

FRACTURES OF THE STERNUM.

These, when mere solutions of continuity, only require general treatment: viz. a piece of soap plaster; a roller round the body; quietude, and antiphlogistic means, especially bleeding.

However, when a fracture of the sternum is attended with a depression of a portion of the bone, the urgent symptoms, thus produced, often require a prompt elevation of the part beaten inward. For this purpose, an incision must generally be made in the integuments covering the bone, and, if the depressed portion of the fracture cannot be raised, by means of an elevator, it must be removed, either with a trephine, or one of Mr. Hey's saws, according to the same directions, as are given in the chapter on injuries of the head. Copious bleeding will be proper after such an operation.

Fractures of the sternum are frequently attended with a train of very alarming symptoms; great pain in the chest, oppressed respiration, a violent cough, palpitations of the heart, extravasation of blood in the chest, and danger of suffocation. Inflammation of the pleura, pericardium, lungs, and heart itself; suppuration in the anterior mediastinum; caries of the bone, and fistulous openings, may follow these injuries.

FRACTURES OF THE RIBS.

The first rib cannot very easily be broken, on account of its guarded situation, beneath the clavicle; the lower false ribs are seldom fractured, because their moveable disposition makes them elude the effect of external violence. When the force is applied by a broad surface, more ribs, than one, are usually fractured. The injury is most commonly situated near the greatest convexity of the bone. A fracture, which is not displaced, is extremely difficult to detect, and, no doubt, is very frequently never discovered. The surgeon should place his hand on the part, where the patient seems to experience a pricking pain, or where the blow has been received; and then the latter should be desired to cough, in which action, the ribs must necessarily undergo a sudden motion, and a crepitus thereby be often rendered perceptible. However, all modern practical surgeons are in the habit of adopting the same treatment when there is reason to suspect a rib to be fractured, as if this were actually known to be the case, by the occurrence of a crepitus, or by the projection of one end of the fracture, which, indeed, in instances, which are displaced, makes the nature of the accident most conspicuous.

When a spicula of a fractured rib is beaten inward, we may easily perceive the reason, why very alarming symptoms should frequently occur; for instance, extravasation of blood, emphysema, inflammation in the chest, &c.

Excepting any particular urgent symptoms should arise, and which it is not my place to consider here, the treatment of fractured ribs is exceedingly simple. The object in view is, to render the injured bone, or bones, during the cure, as motionless as possible. For this purpose, a piece of soap plaster is to be applied to the situation of the fracture, and a broad roller is to be firmly put round the thorax. However, as a roller is very apt to become slack, it is generally better to get a piece of strong linen, sufficiently large to surround the chest. This cloth is then to be made to compress the ribs, by lacing it with proper tightness.

Every person, in not a debilitated state, having a broken rib, or supposed to have such, should be bled as soon as the surgeon has applied a bandage.

If a troublesome cough should afflict the patient, and disturb the fracture, the spermaceti mixture, with opium, should be exhibited.

FRACTURES OF THE VERTEBRÆ.

The spinous, oblique, and transverse processes, and even the bodies of the vertebræ, are sometimes fractured. The spinous processes may be ascertained to be broken by the touch, unless the swelling of the soft parts should be too considerable. The other fractures of the vertebræ can hardly be detected with certainty. When the broken spinous processes are out of their proper situations, they may generally be replaced with the fingers. Then the surgeon should place, on each side of the fracture, a piece of soap plaster, and over this a pad, and a small longitudinal strip of pasteboard. All these are to be retained in their situation by a roller applied round the body.

Very alarming symptoms generally originate in cases, in which other parts of the vertebræ are fractured, and they are imputable to the concussion, compression, or other kind of injury, of the spinal marrow. The higher fractures of the vertebræ are, the greater is the danger. A fracture of the upper cervical vertebræ, or of the processus dentatus, or a rupture of the ligament of this process, is commonly productive of instantaneous death. In general, when the patient is not killed in this sudden way, the surgeon can do little more, than employ antiphlogistic means. We read of incisions being made, and of the fragments of bone, causing pressure on the spinal marrow, being elevated and extracted; but, what practical surgeon would venture to imitate such practice?

FRACTURES OF THE OS SACRUM, AND OS COCCYGIS.

The upper part of the os sacrum can hardly ever be broken, on account of its remarkable thickness; but, if it should be thus injured, the surgeon would have to adopt the same plan, as if a vertebræ were fractured. When the lowest part of the sacrum, or the os coccygis is broken, and when the detached piece of bone is driven inward, the surgeon is to introduce his fore finger, previously oiled, into the rectum, and, with the assistance of the fingers of his other hand externally, he is to reduce the displaced part. This being accomplished, little more can be done than applying a piece of soap plaster to the injured part, together with a T bandage; adopting the antiphlogistic regimen; and enjoining the patient to avoid lying on his back, or sitting down.

FRACTURES OF THE OS INNOMINATUM.

This is not a very common accident; but, it sometimes occurs, in consequence of such violence, as would be produced by the passage of a heavy carriage over the pelvis, and the case is always exceedingly dangerous, on account of the simultaneous injury, which the viscera and other parts sustain. The antiphlogistic treatment seems to be the only thing likely to be of any utility; for, little good can be expected from bandages. In fractures of the bones of the pelvis, it frequently becomes necessary to use the catheter, in consequence of the patient's inability to void his urine. The surgeon must also direct his attention to any particular symptom, that may arise.

FRACTURES OF THE OS BRACHII.

This bone may be broken at its head, its lower part, or at any point between these two situations. A fracture of the head of the bone can only be distinguished by a very careful examination; but, when any other part of the os brachii is broken, the case is in general most easily detected by the occurrence of a crepitus. The fracture may be simple, compound, or complicated. The broken ends of the bone may be in a state of apposition: or they may be drawn asunder, and the limb be more or less shortened. When the lower end of the fracture is at all retracted, the biceps muscle, brachialis internus, and coraco-brachialis, are to be relaxed, and moderate extension made. When the fracture is situated near the elbow joint, the ends of the bone are hardly ever displaced, and consequently, no extension whatever is commonly requisite. When the external, or internal, condyle is fractured, the muscles, arising from the part, should be relaxed; a piece of soap-plaster, a figure-of-eight bandage, and a splint, to the side of the arm, on which the injury is situated, should be applied, and the forearm placed in a sling. The external condyle cannot be broken, without the fracture communicating with the joint, and, in every instance, in which there is reason to suspect this event, it is necessary to move the joint occasionally, in order to prevent the formation of adhesions within the capsular ligament, and an irremediable stiffness of the articulation.

In ordinary fractures of the arm, it is usual to apply two pieces of soap plaster, which together surround the limb, at the situation where the accident has happened. Extension, if necessary, being now made by an assistant, who at once draws the lower portion of the bone downward, and bends the elbow, the surgeon is to apply a roller round the limb. The external splint is to extend from the acromion to the outer condyle, and being lined with a soft pad, the wood cannot hurt the limb by pressure. The internal splint is to reach from the margin of the axilla to a little below the inner condyle, and is to be well guarded with a pad, filled with tow, or any other soft materials. Some surgeons are content with the application of two splints; but, though the two above-described are those, on which we are to place the greatest reliance; yet, as the cylindrical form of the arm conveniently allows us completely to incase this part of the limb in splints, I shall always be an advocate for the employment of four; one on the outside, one on the inside, one on the front, and another on the back of the arm. These are to be carefully fixed in their respective situations with tape.

FRACTURES OF THE FOREARM.

The radius and ulna may be broken at their middle, or extreme portions. Of the two bones, the radius is much the most frequently fractured. When only one bone is broken, the ends of the fracture are, in general, not much displaced. Sometimes, however, the radius, when fractured alone, is drawn toward the ulna, and in a few still more uncommon instances, the latter bone, when the only one broken is inclined towards the radius. When both bones are broken, the ends of the fracture are liable to be displaced; nay, cases are recorded, in which the radius and ulna have so pressed against each other, that they have grown together, and the pronation and supination of the hand been totally destroyed. Fractures of the radius are very easily detected; for, on endeavouring to rotate the bone, or, in other words, to place the hand alternately in a prone, or supine posture, a crepitus is commonly perceived. When the two bones are broken, together with the crepitus, there is usually an evident distortion in the figure of the forearm. Fractures of the ulna, especially when situated high up, are not always very manifest to the touch. However, if the surgeon make pressure on each side of the suspected point, with his thumbs alternately, he may generally distinguish a grating sensation. When only one bone is fractured, no extension is ordinarily requisite; but, if both the radius and ulna should be thus injured, moderate extension ought always to be made.

During the treatment, the elbow is to be bent, and the hand put in the mid-state, between pronation and supination; that is to say, the palm of the hand is to face the patient's breast. Having reduced the ends of the fracture, if they should appear to be displaced, the soap plaster is to be applied, and over this a slack roller. No one can doubt, that tight bandages may act very perniciously in fractures of the forearm, by pressing the radius and ulna together, causing them to grow to each other, or, at all events, making the fracture unite in an exceedingly uneven manner. Only two splints are necessary; one is to be placed along the inside, the other along the outside of the forearm. Soft pads must be always interposed between the skin and the splints, in order to obviate the pressure of the hard materials, of which the latter are formed. The inner splint should extend to about the last joint of the fingers; but, not completely to the end of the nails; for, many patients, after having had their fingers kept for several weeks in a state of perfect extension, have been a very long time in becoming able to bend them again.

FRACTURE OF THE OLECRANON.

This case is easily distinguished, by the detached piece of bone being drawn upward from the rest of the ulna. The treatment consists in relaxing the triceps and anconæus, by placing the arm in an extended position; in pushing downward, and replacing, the detached part of the olecranon; and in confining it in a proper situation by means of compresses and a circular bandage, applied immediately above the point of the broken process. The arm is to be kept constantly extended by a splint, put in front of the arm and forearm. After a time, it is recommended to move the elbow very cautiously and gently, in order to prevent the occurrence of a stiff joint.

FRACTURES OF THE METACARPAL BONES, AND FINGERS.

In the first sort of case, the hand is to be laid on a flat splint, after a piece of soap plaster, and a roller, have been applied. When the fingers are fractured, surgeons are usually content with keeping the part steady by longitudinal pieces of pasteboard put over the soap plaster, along each side of the finger, and tied on by tapes. During the treatment, the hand should be kept at rest in a sling.

FRACTURES OF THE THIGH.

The fractured os femoris is attended with the following symptoms; severe local pain at the instant of the accident; sudden incapacity to move the limb; a crepitus, which is sometimes very distinct on moving the ends of the fracture; deformity, which occurs in a triple relation to length, breadth, and direction. In regard to this latter diagnostic mark, viz. the deformity in cases of fractured thighs, it is necessary to have very precise ideas; for, as it has a continual propensity to be produced, particularly, in oblique fractures, its prevention is the principal object in the treatment.

By far the majority of fractures of the thigh are attended with deformity; a few transverse ones, and a few situated near the condyles of the os femoris, are the only exceptions. If we consider the deformity, in regard to length, we find, that, in oblique fractures, the limb is constantly shorter, than that of the opposite side, a circumstance plainly indicative of a displaced state of the ends of the fracture. By examining the situation of the accident, one may easily ascertain, that the shortening of the limb arises, altogether, from the lower end of the fracture being drawn upward, beyond the upper one, which itself remains motionless. The muscles are the only powers, which can cause this motion of the lower end of the fracture, from below upward. Attached on one side to the pelvis, and, on the other, to the patella, tibia, and fibula, they make the former their fixed, and the latter their moveable points; and drawing upward the leg, the knee, and the lower portion of the os femoris, they produce the displaced condition of the fracture. The triceps, semitendinosus, semimembranosus, rectus, gracilis, biceps, &c. are the chief agents.

In Desault's works,* from which I have extracted the above accurate remarks, a case is mentioned, which affords a very striking illustration of the power of the muscles, in producing a derangement of the ends of a fracture. A man broke his thigh; but, the ends of the bone were not at all displaced, though the fracture was oblique. This circumstance was discovered to be owing to paralysis of the limb; and no sooner was the latter affection cured, and did the muscles regain their power of contraction a few days afterwards, than the lower end of the broken bone was drawn upwards, as in ordinary cases.

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*Tom. 1, par Bichat.

I have often observed, that fractured thighs are most apt to be followed by a permanent shortness of the limb, when they are treated on beds, which are too soft and yielding. Desault observes, that how firm soever the bed may be, as the buttocks form a greater projection, than the other parts of the body, they soon cause a depression in the bedding, and hence a declivity of the plane, on which the trunk lies, is produced, so that the body glides downward, pushing before it the upper end of the fracture, and making it pass beyond the lower one. No one can doubt, that the beds, on which broken thighs are placed, ought to be as unyielding as possible.

Transverse fractures of the thigh are not so subject, as oblique ones, to be attended with a shortening of the limb; because the surface of the upper end of the fracture makes a mechanical resistance to the ascent of the lower one.

The deformity of the limb, in regard to breadth, must necessarily accompany that in respect to length; but, in transverse fractures, the first sort of displacement of the ends of the bone may, obviously, be the only one.

In Desault's works by Bichat, from which most of the preceding account is taken, it is next explained, how the deformity, in regard to direction, may result from the operation of the blow causing the fracture; from the awkwardness of those, who carry the patient; or, from the bad position, in which the limb is placed.

Besides the above kinds of deformity, the lower end of a fractured thigh bone is ordinarily rotated outward; an effect, which all the strong muscles have a tendency to produce.

We may set it down as an invariable fact, that the higher a fracture is situated in the thigh bone, the greater is the difficulty in keeping the ends of the fracture in reciprocal contact. The reason of this circumstance is entirely owing to the additional number of muscles, which, in this kind of case, acquire the power of drawing upward the lower portion of the broken bone. It is obvious, that muscles, which have their insertion above the breach of continuity, can have no effect in displacing the fracture, in regard to the length of the limb.

When the neck of the os femoris is fractured, very severe pain is experienced at the upper part of the thigh, and especially, in the groin; and, hence, the limb cannot be moved, without putting the patient to excruciating agony. The extremity is usually shortened; the trochanter major being turned outward, and drawn upward upon the dorsum of the ilium. On extension being made, so as to bring down the end of the bone, which was displaced by the action of the muscles, a crepitus may be frequently felt. It must obviously make a great difference, in regard to the degree, in which the limb becomes shortened, whether the fracture is situated within, or on the outside of, the orbicular ligament. The ascent of the external end of the fracture must be greatly limited by this ligament, when the accident is situated within it, and the ligament itself is unlacerated. Nothing is a surer mark of the neck of the thigh bone being fractured, than the toes being turned outward, while the knee is in a moderate state of flexion.

When the fracture is within the orbicular ligament, the case is often difficult to ascertain with certainty; pain, and inability to move the thigh, are almost the only symptoms. The knee, and toes, however, may be observed to be somewhat more turned outward, than in the natural state, in consequence of the action of the muscles, which rotate the bone in this direction, being no longer counteracted by the resistance, arising from the continuity of the neck, and head of the bone, when the latter part is lodged in the acetabulum.

TREATMENT OF FRACTURED THIGHS.

Mr. Pott, seeing that the difficulty both in reducing displaced fractures of the thigh, and in maintaining the ends of the bone in a proper state of apposition, arose from the action of such muscles, as could draw upward the lower portion of the broken os femoris, introduced into practice the method of placing the limb in a bent position, by which, he conceived, the most powerful muscles were relaxed. The same position he recommended, both at the time of reduction, and during the future treatment. He states, that the position of the fractured os femoris should be on its outside, resting on the great trochanter; the patient's whole body should be inclined to the same side; the knee should be in a middle state, between perfect flexion and extension, or half bent; the leg and foot lying on their outside, also, should be well supported by smooth pillows, and should be rather higher in their level, than the thigh. One very broad splint of deal, hollowed out and well covered with wool, rag or tow, should be placed under the thigh, from above the trochanter quite below the knee; and another, somewhat shorter, should extend from the groin below the knee on the inside, or rather in this posture on the upper side; the bandage should be of the eighteen-tailed kind, and, when the bone has been set, and the thigh well placed on the pillow, it should not, without necessity, be ever moved from it again until the fracture is united.*

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* Some few general Remarks on Fractures and Dislocations, in Chirurgical Works, vol. 1.

Such is the plan, which was recommended by the above celebrated surgeon, and which is now most generally adopted in this country.

Whoever peruses Mr. Pott's remarks on fractures with attention will be led to think, that this eminent practitioner actually conceived, that the above position of the limb would relax every muscle connected with the broken bone; a thing, which is certainly not effected. But, I believe, that when the direction, in which the lower end of the fracture is displaced, is taken into consideration, viz. upward, behind the upper portion of the os femoris; and when the muscles, which have the greatest tendency to produce this effect, are calculated; it will be granted, that most of such muscles, *as have the greatest influence over the fracture*, are more relaxed in the bent, than they are in the straight position of the limb. However, Mr. Pott, by the term *relaxation*, might possibly mean only a state, in which the muscles are not actually stretched, though the origins and insertions of many of them might be brought much nearer together.

After all, however, that has been said and written upon this subject, it cannot be denied, that the bent position does not completely incapacitate all the muscles from displacing the fracture, and, of course, every possible assistance ought to be derived from the splints and rest of the apparatus. Nor will it be denied, that the bent position is attended with the great disadvantage of leaving the leg in a moveable, unsupported state; a consideration, in my mind, strongly against this mode of treatment, inasmuch as every motion of the leg creates the most hurtful disturbance of the fracture of the thigh. The bent posture may relax many of the most troublesome muscles; but, yet, it cannot hinder all of them from disturbing the fracture, and it leaves the leg unfixed. The extended posture may not relax quite so many of the muscles, which tend to displace the fracture; but, it affords an opportunity of applying splints to the whole limb, an object of the highest importance.

There is one part of the position, advised by Mr. Pott, for which I have never heard any reason assigned; and as the adoption of it seems to me likely to be detrimental, I cannot refrain from delivering my sentiments on the subject, how presumptuous soever they may appear. I allude to the direction to place the leg and foot rather higher in their level, than the thigh. Whoever has had opportunities of seeing many cases of broken thighs, must know, that when the ends of the fracture have become firmly united, the toes are frequently turned more outward, than is proper. Now, I conceive, that nothing has a greater tendency to promote the occurrence of this deformity, than twisting outward the lower portion of the broken bone, by elevating the leg and foot above the level of the thigh; and as this inconvenience does not seem to be counterbalanced by any manifest good, why should practitioners persevere in a servile adherence to what they do not understand?

Mr. Pott has only mentioned two splints: the generality of practitioners now employ four. After placing the patient in a proper position, the necessary extension is to be made. Then the under splint, having upon it a broad soft pad, and an eighteen-tailed bandage, is to be laid under the thigh, from the great trochanter to the outer condyle. The surgeon, before applying the soap plaster, and other splints, is to take care, that the fracture lies as evenly as possible.

FRACTURE OF THE PATELLA.

This bone is most frequently broken in a transverse direction. The accident may happen in two ways, viz. in consequence of the action of external bodies, or of the extensor muscles. In the latter instance, the equilibrium of the body, having been inclined backward, the muscles in front contract to bring the line of gravity forward again; the extensors of the leg, among other powers, exert themselves with such violence on the patella, that they pull the upper from the lower portion of this bone, and the patient falls down. Thus the fall is the consequence, not the cause, of the acccident. The patella has been known to be fractured by making a very forcible kick: the olecranon, by merely throwing a stone.

Longitudinal fractures of the patella are not very obvious; but, transverse ones are easily recognized, in consequence of the upper portion of the bone being drawn a considerable way up the thigh, and there being a large interspace, between the two pieces of the broken bone, very distinguishable by the touch. If the limb be extended, and the upper part of the patella be pushed sufficiently downward to touch the lower portion, a crepitus is felt. The patient cannot walk, suffers great pain, and experiences, in most cases, a total inability to extend the leg. However, the last circumstance must differ, according to the situation of the fracture.

TREATMENT.

The separation of the two pieces of a broken patella arises both from the contraction of the extensor muscles, which draw upward the superior portion, and from the flexion of the knee, by which the inferior part is moved downward. Hence, the proper means, for maintaining the fracture in a state of apposition, are such as oppose the action of the muscles, and such as keep the leg permanently extended. The power of the muscles is to be diminished by putting them in a state of relaxation, and by compressing them with a roller. The leg is to be extended on the thigh; this is to be bent on the pelvis; a bandage is to be applied to the whole thigh; and, lastly, some mechanical resistance is to be made above the upper portion of the broken bone. For the last purpose, a compress is usually put under the roller. The limb is most conveniently kept in the proper position, by placing two splints along the sides of the knee joint, and making the part of the bed, on which the leg and thigh are laid, gradually ascend to a proper height, from the patient's buttock to his heel.

It is remarkable, that the broken patella hardly ever unites by means of callus: the connecting substance, in at least ninety-nine cases out of a hundred, is found to be of a ligamentous, or cartilaginous nature.

FRACTURES OF THE LEG.

When both the tibia and fibula are broken, the patient cannot bear the weight of his body on his limb; but, when the fibula alone is fractured, though progression is attended with pain and difficulty, it is not altogether impracticable. In examining a leg, suspected to be fractured, the surgeon should trace the anterior surface of the tibia, called the shin, and the spine of this bone, in order to ascertain, whether any inequality, or projection, exists. However, in fractures of the tibia, a crepitus generally makes the nature of the case sufficiently manifest. When the fibula is the only bone broken, the injury is not so easily ascertained, because the tibia, the main bone of the leg, still preserves the stability of the limb, while no crepitus is very often distinguishable. When both bones are broken, the action of the muscles of the calf, together with the weight of the limb itself, usually occasions a distortion of the leg, the heel being drawn backward, and the foot inclining towards the side, to which its own unsupported weight inclines it. In oblique fractures, the deformity is always most conspicuous, and the sharp point of the lower end of the tibia frequently makes a considerable projection forward, threatening to protrude through the skin. The latter effect is entirely owing to the strong action of the muscles, situated on the posterior part of the leg. This cause commonly produces, at the same time, a shortness of the injured limb.

Mr. Pott takes notice of a very common case, and one which, when care is not taken to relax the muscles, often proves exceedingly troublesome. This eminent practitioner observes, that when the tibia is forced from its just and perpendicular position on the astragalus, probably the capsular ligament, but, always these strong ligamentous fibres, which connect the lower end of the tibia with the astragalus, and os calcis, must be lacerated. Such is the case, when the fibula breaks within two or three inches of the malleolus externus; when the inferior end of the fracture falls inward towards the tibia; when the malleolus externus is turned somewhat outward, and upward; and the tibia, having lost its proper support, is forced off from the astragalus inwards. To this perfect fracture, and partial dislocation, is sometimes added a wound in the integuments, made by the bone at the inner ankle.

The difficulty in reducing the case, and keeping it so; the distortion of the foot upward, and outward; are caused by the action of such muscles, as have tendons passing behind the tibia and fibula, under the os calcis, or attached to these bones. Hence, in this instance, the utility of relaxing the powerful muscles, is strikingly exemplified. If the limb be laid on its outside, with the knee moderately bent, the muscles forming the calf of the leg, and those which pass behind the fibula, and under the os calcis, are, to use Mr. Pott's expression, all put into a state of relaxation, and non-resistance; all the difficulty and trouble, in general, vanish immediately; the foot may easily be placed right, the joint reduced, and, by observing the same position, every thing will commonly succeed.* Mr. Pott's posture for a fractured leg and thigh, is represented in the annexed engraving.†

Mr. Sharp's splints, made of tin, instead of pasteboard, are as good as any, which can be employed. They should always be of sufficient length to extend from the condyles of the os femoris quite to the foot. The muscles being relaxed, by placing the limb in the position represented in the plate, the surgeon is to make such extension as seems requisite for bringing the ends of the fracture into even apposition. Then he is carefully to raise the leg a little way from the surface of the bed, by taking firmly hold of the limb, below and above the fracture, and elevating the broken bones together in such a way, as shall keep both the upper and lower portions, as nearly as possible, on the same level. At this moment, an assistant should put exactly under the leg the lower splint, which has been previously prepared, by covering it with a soft pad, and laying over this an eighteen-tailed bandage. The leg is now to be gently depressed, till it becomes supported on the apparatus. The surgeon, be-

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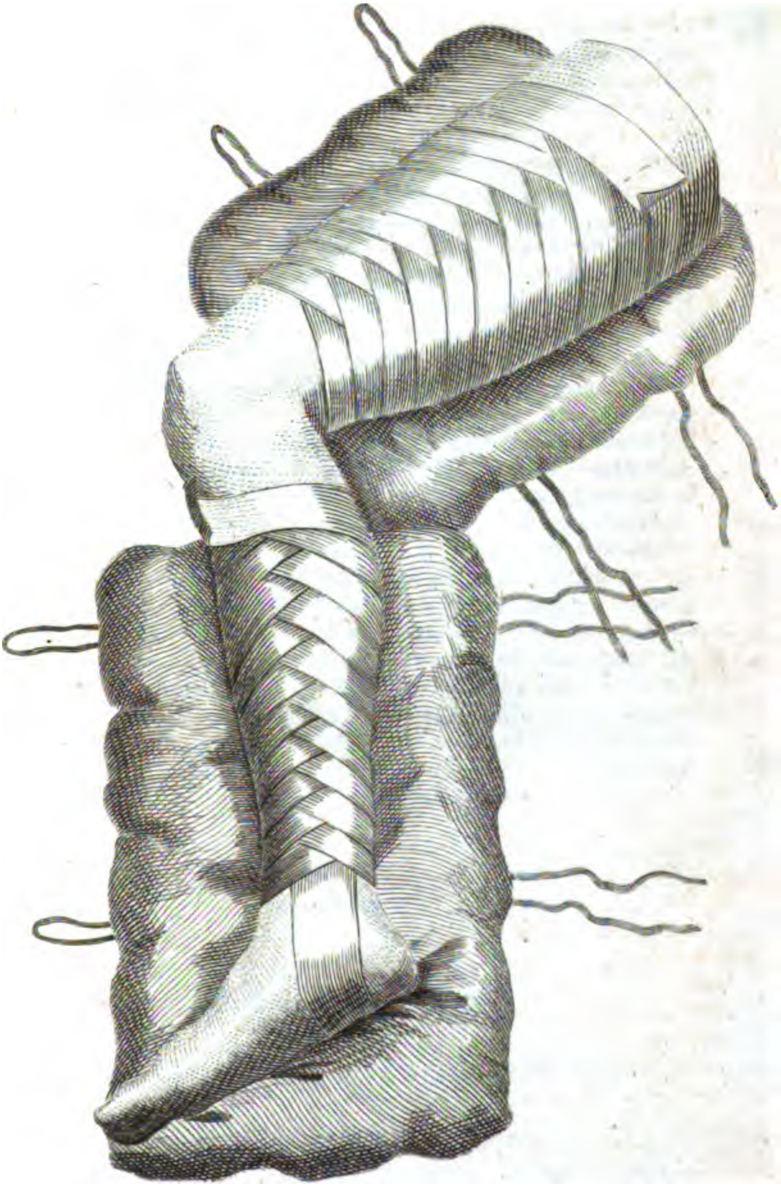
* Chirurgical Works, vol. 1. p. 328, 331, edit. 1808.

† Plate IX.



Published April 1 [illegible] by R. Phillips, Bridge Street, Blackfriars London.

fore he proceeds further, should once more observe, that the ends of the bones are evenly in contact. Being assured of this important point, he is to apply a piece of soap plaster over the situation of the fracture, and lay down the tails of the bandage. Another soft pad, well filled with tow, is next to be put over the upper surface of the leg, and the other splint applied. The straps should be tight enough to make the splints prevent any motion of the ends of the fracture. The pressure of these hard instruments is often exceedingly painful, and even productive of sloughing, and ulceration, unless the surgeon skilfully places soft materials between them and such parts as seem most liable to be injured in this manner; for instance, the lower end of the fibula; the outside and inside of the foot; the inside of the knee, &c.

Besides the two splints and pads, already mentioned, I find, when the fracture is oblique, and the heel has a great tendency to be drawn backward, that this effect is materially counteracted by applying a compress, and longitudinal piece of pasteboard, from the lower part of the belly of the gastrocnemius muscle to the heel, under the straps of the other splints. I have observed, that this method prevents deformity in a very powerful manner.

When there is a great deal of contusion of the soft parts, together with the injury of the bones, it is better, at first, to keep the leg wet with the lotion of sal ammoniac and vinegar, by means of linen dipped in this application, and put under the splints. The splints need not be taken off every time it is necessary to wet the linen again; it is quite sufficient to squeeze the fluid out of a sponge, into the interspaces between the above instruments. Nothing is so prejudicial, in cases of fractured bones, as too frequently moving the injured parts.

CHAP. LXXVI.

PARTICULAR DISLOCATIONS.

DISLOCATION OF THE LOWER JAW.

The lower jaw bone may be said to be subject to only one [illegible] of dislocation, in which the condyloid processes advance be[illegible] the eminentia articularis, and slip under the zygoma. S[illegible]imes, the luxation is only on one side, but, in general, on both. In the latter case, the appearance of the countenance is much altered; the mouth is widely open, and cannot be shut; and the length of the face is very much increased by the chin being thrown forward, and downward, towards the breast. When only one condyle is dislocated, the mouth is distorted, and turned towards the opposite side, while the fellow teeth of each jaw do not correspond. However, according to Mr. Hey,* one condyle of the lower jaw may be dislocated, without there being any distortion of the chin towards the opposite side, shewing the nature of the accident. All dislocations of the jaw are attended with considerable pain, an inability to articulate words; an incapacity of swallowing; and a discharge of saliva from the mouth.

The jaw bone cannot be luxated in this manner, unless the mouth, just before the occurrence of the accident, be very much opened, in which state, the condyles of the bone are naturally moved forward. Hence, the dislocation mostly happens, when the patient is laughing, gaping, &c. A blow on the jaw, when the mouth is considerably open, may easily cause the accident. The case is sometimes produced by the force, used in drawing a tooth. Whenever the lower jaw has once been dislocated, any of the preceding causes reproduce the occurrence with much more facility.

It is evident from the circumstances, in which a person with a dislocated jaw is placed, that very severe complaints, and even death, may follow the accident, if no assistance should be given.

In reducing a dislocated jaw, the surgeon is to make the bone act as a lever, in moving the displaced condyles. The thumbs, well covered with a pair of thick gloves, are to be introduced, as far backward as possible, along the grinding teeth. Then, with the fingers and palms of his hands, the practitioner is to take firm hold of each side of the dislocated bone, and, while he depresses the condyles with his thumbs, he is to elevate the chin. These two actions co-operate to produce the same effect. As soon as the condyles are freed from their confined situation, beneath the zygoma, the contraction of all the muscles, which are concerned in shutting the jaw, almost at the same instant, both draws the condyloid processes back into their natural situation, and forcibly closes the mouth, so that the surgeon's thumbs would be in danger of being bitten, if care were not taken to cover them with thick gloves, and withdraw them, immediately the reduction is effected. When only one condyle is dislocated, the same plan of reducing the part is applicable to the side, on which the accident is situated.

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* Practical Observations in Surgery, p. 325, edit. 2.

Reduction having been accomplished, the patient should, for some time afterwards, avoid all such actions as laughing, yawning, &c. and the jaw should be supported by a bandage with four tails, in the same way as was recommended for the fractured lower jaw.

DISLOCATION OF THE HEAD.

The os occipitis is so firmly connected with the first cervical vertebra, or atlas, that it is hardly possible, that any separation should originate from external force. However, the articulation of the atlas and dentata, that is, of the first and second vertebræ, not being so strong, either a dislocation forward may occur in consequence of a rupture of the ligaments, which naturally confine the processus dentatus in its situation in front of the spinal marrow, or a luxation, sideways, may be produced, in consequence of that process itself being fractured.

Such alarming accidents may happen, when a person is thrown from a horse, or falls from any high situation, so as to pitch on his head, or receive a very violent blow on his neck. When the processus dentatus is dislocated backward, the head itself is thrown forward, and is preternaturally moveable; the face swells; the eyes become prominent; the mouth is open; the tongue is motionless; the respiration difficult; the pulse small, and slow; the body is deprived of sensibility and motion; and the patient is in a dying state.

A *complete* luxation of the upper cervical vertebræ is productive of almost instantaneous death, by the injury, or compression, which the spinal marrow must inevitably suffer. But, an *incomplete* dislocation, we are informed, may sometimes admit of relief, and life be preserved by the timely interference of art. There are, certainly, in different museums, anchylosed cervical vertebræ, in which the canal for the spinal marrow is very much lessened, in consequence of a preceding partial luxation. Callisen informs us, that he has such specimens in his own possession. However, we may fairly infer, from the remaining diminution in the canal for the spinal marrow, that art had very little share in the cure, and that the preservation of life, was not owing to the dislocation having been reduced; but, to the spinal marrow having accommodated itself to any slight pressure, which it might have suffered.

There can be no doubt of the rationality of attempting an immediate reduction of the processus dentatus, if signs of life should exist. This process is thrown back, so as to compress, or injure the spinal marrow, while the atlas, and head itself, are thrown forward. The recollection of these circumstances will enable a surgeon to do what is proper, better, than any detailed directions. It seems, also, needless to explain, exactly, how he should proceed, if the processus dentatus were fractured, and the second vertebra, consequently, luxated sideways.

DISLOCATION OF THE VERTEBRÆ.

The dorsal and lumbar vertebræ are very rarely dislocated, on account of the strength of the ligaments, and the conformation of the bones themselves. However, occasionally, the oblique, or articular processes being fractured, by the operation of great violence, these bones are dislocated.

The symptoms are, an incapacity to stand erect; the patient leaning sideways, or forwards; the spinous processes become irregular in their arrangement; and there are signs of the spinal marrow being injured, or compressed; retention, or incontinence of the urine, and feces; the lower extremities become paralytic and motionless; and even death itself may follow. The symptoms must necessarily vary, according to the degree of pressure, which the spinal marrow suffers, and the situation of the luxation. Similar symptoms may also arise, when the spinal marrow has merely undergone a very violent concussion, without any dislocation of the vertebræ.

The ancients have given us descriptions of various machines for reducing these luxations; but whoever considers the danger there is of increasing the pressure on the spinal marrow, instead of diminishing it, by the application of force, will be cautious not to be too bold.*

It is very certain, that most of the cases, mentioned by authors, as dislocations of the vertebræ, have only been concussions of the spinal marrow, or fractures of the above bones.

DISLOCATION OF THE OS COCCYGIS.

This bone is said to be liable to two kinds of luxations; one inward, the other outward. The first case is always occasioned by external violence; the second, by the pressure of the child's head, in difficult labours. The nature of these accidents is easily detected by the foregoing cause, and by an examination with the fingers, externally, and within the rectum. Pain; retention of the feces, and urine; an afflicting tenesmus; inflammation, sometimes, terminating in abscesses, which interest the rectum; are the symptoms, said to attend, and follow, dislocations of the os coccygis.

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* The relation of a case, in which the reduction of a dislocation of the cervical vertebræ is stated to have been accomplished, may be found in Schmucker's Vermischte Chirurgische Schriften, band 1, p. 284.

Luxations of this sort are easy of reduction. When the bone is dislocated outward, it may be readily replaced in its natural situation, by making proper pressure externally, and supporting the little bone, at the same time, by a finger introduced into the rectum. The reduction being finished, a piece of soap plaster, a compress, and the T bandage, may be applied.

When the os coccygis is luxated inward, the surgeon is to smear his fore finger with oil, and introduce it into the rectum. Then the bone is to be pressed outward, while proper resistance is made externally with the fingers of the other hand. After the reduction, all pressure is to be carefully avoided, lest the bone should be forced inward again.

DISLOCATION OF THE RIBS.

These bones are very rarely luxated at their articulation with the vertebræ; but, the case is said to occur every now and then in practice. Authors state, that a hollow is perceptible at the side of the transverse process of the vertebra; and that when pressure is made on the thorax, so as to push backward the dislocated rib, the head of the bone may be distinctly felt moving into its proper situation, provided the fingers are duly placed for this purpose.

M. J. L. Petit believed, that the ribs were never in reality dislocated. However, Paré, Heister, Platner, and most surgical writers, not only admit the possibility of the accident, but, notice several varieties of it, besides the preceding symptoms.

The treatment of a dislocated rib, were the accident to occur, would be very simple; the displaced head of the bone is to be first reduced by firmly pressing backward its anterior end. Then a thick compress is to be placed over the front extremity of the bony part of the rib; while another compress is put over the transverse processes of the vertebræ; and both are to be kept on by a roller.

The same symptoms, which occasionally result from fractures of the ribs, may follow dislocations, and will require such treatment, as was explained in the preceding chapter.

When a rib is forcibly separated from its cartilage, or this from the sternum, the case demands the same treatment as a fracture.

DISLOCATION OF THE CLAVICLE.

Fractures of the clavicle are much more common, than dislocations, as any one might easily infer, who considers the vast strength of the ligaments, the slender structure, and exposed position, of the bone, and the direction, in which external force will commonly operate upon it. A dislocation is much more common at the sternal, than the scapular, extremity of the clavicle, on account of the greater degree of motion, which takes place at the former situation, and the weaker structure of the ligaments, than at the articulation with the acromion. When a dislocation happens at the sternum, the clavicle is usually thrown forward; sometimes, however, backward, in which event, the symptoms are in general severe, on account of the pressure produced by the bone on the parts situated in the anterior part of the neck.

The dislocation of the scapular end of the clavicle is always upwards; for, the root of the coracoid process, on which it rests, will not allow the bone to descend below the acromion. A luxation of the clavicle from the scapula is liable to be mistaken for a dislocation of the os brachii, in consequence of the front and upper portion of the deltoid muscle becoming flattened, and there being an apparent depression at the top of the shoulder. The treatment consists in taking off the weight of the arm, by placing the elbow and forearm in a sling; in pushing downward the scapular end of the clavicle, while an effort is made to raise the acromion; and, in applying compresses, and a spica bandage, for the purpose of keeping the end of the clavicle from ascending again.

At the time of attempting to reduce this dislocation, the trapezius muscle ought to be relaxed.

The dislocation of the clavicle from the sternum is to be reduced, by making pressure in a proper direction. The arm is to be kept at rest in a sling; and, in short, the same treatment is to be adopted, as if the bone were broken.

DISLOCATION OF THE OS BRACHII.

The shoulder joint is so loose, and moveable, and the glenoid cavity of the scapula so shallow, that more dislocations are said to occur in this situation, than in all the other joints together. The acromion and the coracoid processes of the scapula, and the ligament between them, prevent luxations upward.

The arm may be luxated directly downward, in such a way, that some point of the head of the bone may rest against the inferior edge of the scapula. This case, however, is uncommon. The head of the os brachii may, also, be dislocated forwards, towards the breast; or it may be luxated backwards under the spine of the scapula. The two latter cases are exceedingly common. The three abovementioned dislocations are usually distinguished by the terms, *downward, forward*, and *backward.*

In the dislocation downward, the arm seems longer, than is natural, and it is a little raised from the side; while the forearm is extended, in consequence of the tension of the triceps muscle. The arm cannot possibly be approximated to the chest, nor can the forearm be bent, without creating pain. A vacancy is distinguishable under the acromion; and the deltoid muscle, being unsupported by the head of the bone, the fulness of the shoulder is lost. The head of the os brachii may be felt in the axilla, and the bone cannot be raised in a line with the acromion.

When the luxation is backward, the elbow is very much inclined towards the fore part of the thorax, from which posture it cannot be moved, without considerable pain. The pectoral muscle is in a state of tension, and the limb seems longer, than is natural. This luxation is not so frequent as the next.

When the os brachii is dislocated forward, the arm is very much shortened; the head of the bone may be felt, forming a protuberance under the pectoral muscle; the forearm is somewhat bent; the elbow is thrown to a little distance from the side, and cannot be placed near it, without the patient experiencing a good deal of pain; the coracoid process cannot be very easily felt; and the hollow, below the acromion, though plainly distinguishable, is not so manifest, as when the head of the bone is thrown downward into the axilla, or backward beneath the spine of the scapula.

When the head of the bone lodges in the axilla, its pressure on the nerves and large veins may occasion paralysis, and œdema, of the limb.

We may conclude, when the os brachii is dislocated forward, that the tendons of the muscles of the scapula must often be ruptured.

The best modern surgeons are of opinion, that none of the mechanical contrivances for making extension, devised by the ancients, are so eligible as a skilful employment of the power of the hands alone.

The first object, in the treatment of the dislocation, is to dislodge the head of the os brachii from the situation, which it occupies, in order to bring it on a level with the glenoid cavity of the scapula. To accomplish this purpose advantageously, proper extension must be made, while the bone itself should be made to operate as a lever in moving its head to any side, by having a long towel placed a little below the axilla, by means of which towel, skilfully pulled by an assistant, the necessary fulcrum may be formed.

As soon as the head of the bone is brought opposite the glenoid cavity, the limb should be resigned to the action of the muscles, which draw the bone into its natural situation

When the extension is made, it is necessary to fix the patient's body, by placing a broad towel round the chest, and tying it to some fixed immoveable point. The clavicle and scapula are, also, to be kept back with the hands of an assistant. The elbow is to be bent. The extending power should be applied a little above the condyles of the os brachii. The extension should be, at first, very gradual, and it should not be remitted, till the object in view is accomplished; in this way, the muscles of the most athletic man may be overcome; while the most violent extension, not regularly maintained, will often fail. The part of the arm, round which the towel for making the chief extension is placed, should be defended by flannel.

When the head of the bone has been so moved, that it seems likely to return into the glenoid cavity, by the action of the muscles, the assistants, who are making the extension, are to be directed to diminish it. On this being done, if the surgeon merely attend to keep the head of the bone on a level with the socket, the reduction spontaneously follows.

The arm is afterwards to be kept at rest in a sling, and a piece of soap plaster, and a spica bandage, are to be applied to the shoulder. Some surgeons use multiplied pullies for making extension, and as far as my own experience extends, they answer the purpose extremely well.

DISLOCATION OF THE ELBOW.

The bones of the forearm cannot be thrown forward, without a fracture of the olecranon, and a luxation in this direction is exceedingly uncommon. The kind of dislocation, most frequently occurring at the elbow, is that, in which the upper heads of the radius and ulna are displaced backward. This accident is rendered easy of occurrence by the small size of the coronoid process of the ulna, which part slips behind the os humeri and is drawn up as high as the cavity, in which the olecranon is naturally lodged in the extended state of the forearm. The next most frequent dislocation at this part consists in the ulna being pushed into the place of the radius, on the lower end of the humerus. The form of the bones is almost an insurmountable obstacle to a dislocation ever taking place inwards. All the lateral luxations of the elbow are usually incomplete ones, by which it is meant, that the articular surfaces are still in partial contact. The great extent of the surfaces of the heads of the bones, in the transverse direction, must render a complete lateral luxation hardly possible, without the application of such violence, and the occurrence of such mischief to the soft parts, that the limb could not be preserved.

From the perusal of books, one might suppose, that all dislocations at the elbow were so obvious, that no man, however deficient in talents and attention, could possibly fall into error. This is far from being true; for, accidents of this kind are commonly productive of so rapid and considerable a degree of swelling, that the form of the joint is very much obscured.

When the ulna is pushed into the situation of the radius, the space between the olecranon and internal condyle, is much greater than natural. These points of bone are always very distinguishable, let the joint be ever so much swollen, and hence, the information, to be derived from an examination of them, may be obtained in every case without exception. When the ulna is pushed into the place of the radius, the latter bone cannot be easily rotated, nor can the forearm be bent, and extended in a perfect manner.

Sometimes, the radius is driven forwards, and the ulna backwards, the coronoid process of the latter bone being at the same time occasionally fractured.

Dislocations of the elbow joint are easily reduced, as soon as the necessary extension is made. The arm should afterwards be kept in a sling, and the inflammation of the joint is to be averted, by keeping the part constantly surrounded with linen, wet with the saturnine lotion. The joint might also be supported with a splint on the side, to which the heads of the radius and ulna had been thrown.

DISLOCATIONS OF THE WRIST.

These cases are particularly obvious to the most superficial examiner. The most common directions, in which the carpal bones are dislocated, are backward and forward. The first kind of case is much the most frequently met with in practice. The man's hand becomes considerably distorted, whenever one of the lateral ligaments of the wrist is ruptured; but, the luxations thus arising, are hardly ever complete.

There is never much difficulty in reducing dislocations of the wrist, as soon as moderate extension has been made. When the articular surfaces have been put into a proper situation, in regard to each other, a splint should be applied along the inside of the forearm, and palm of the hand, in order to keep the wrist from moving. I need hardly mention the propriety of wearing a sling.

When the thumb, or fingers are dislocated, they are to be reduced, and incased and supported in pasteboard, the hand and forearm being kept in a sling, till the cure is effected.

DISLOCATIONS OF THE THIGH BONE.

The most frequent case is that, in which the head of the os femoris is dislocated on the obturator foramen, that is downward and forward. This kind of accident is the most common, because the brim of the acetabulum is not so high in the above direction, and the ligamentum teres is inserted so near the notch, which faces the obturator foramen, that the head of the bone may descend in the above way, without the ligament itself being ruptured.

The case, which ranks next in regard to frequency, is that, in which the head of the thigh bone is dislocated upward and outward on the dorsum of the ilium, the great trochanter being situated forward, and the limb being turned inward.

The most rare kind of dislocation is that, in which the head of the os femoris is thrown on the dorsum of the ilium, in such a manner, that the trochanter major projects backward, while the head of the bone is situated obliquely forward. Many surgeons of great experience have never seen this case. However, there is no doubt of its occasional occurrence, as my own observation enables me to state: a thin lad, about fourteen years old, was brought to St. Bartholomew's hospital, during one of Mr. Long's accident weeks, about twelve years ago. The boy had fallen down, by which accident one of his legs became considerably shortened, with the toes turned very far outward.

The head of the bone could be plainly felt behind the trochanter major. There was considerable pain, and the patient was quite incapacitated from moving the limb. I could not move the extremity in any direction, without a great deal of difficulty and resistance, and without making the lad suffer considerable torture. When proper extension had been made, the head of the bone slipped into the acetabulum, and the boy, almost instantly, became free from pain, and acquired the faculty of moving the thigh bone again in every direction. In about ten days, he went from the hospital, able to walk in the most perfect manner.

This is the only kind of dislocation of the thigh, liable to be mistaken for a fracture of the neck of the bone, because the toes are turned outward, and the limb shortened. In the common luxation on the obturator foramen, the toes are turned outward; but, the dislocation is easily discriminated from a fracture, for the whole extremity seems elongated; while, on the contrary, fractures are never attended with any apparent increase in the length of the limb; but, almost always, with a diminution of it, in consequence of the lower portion of the broken bone being drawn upward by the action of the muscles.

When the os femoris is luxated upward and backward, with the trochanter major forward, and the head of the bone backward, the limb is shortened; the thigh, leg, and foot, are turned inward; the patient suffers immense pain, when the os femoris is moved outward, and the fibres of the triceps are rendered still more tense, than they must necessarily be by the nature of the accident; the buttock appears more prominent, on account of the presence of the head of the bone; and the whole limb is often quite numbed, by the pressure on the sciatic nerve.

In reducing dislocations of the thigh, the surgeon should place the patient on the side, opposite that on which the accident has happened; and fix the pelvis by placing a sheet underneath the perineum, and tying it to one of the posts of the bed.

The multiplied pulley, if this be employed, or another sheet is to be fastened round the lower portion of the os femoris, just above the condyles. If the head of the bone be on the dorsum of the ilium, or near the sacro-ischiatic foramen, the extension is to be made in a gradual, and unremitting manner, and in such a direction, as seems to be the midline between a right and perpendicular one, in regard to the pelvis. As soon as the head of the bone has been brought on a level with the acetabulum, the surgeon is to press it towards this cavity, at the same time, that the assistants continue the extension.

When the thigh bone is dislocated forward and downward, the object is to make a lever of the bone itself, by placing a sheet a little way below the trochanters, which sheet being properly drawn upward by an assistant, after a little extension has been made, serves as a fulcrum, on which the head of the bone may be moved into the acetabulum. In order to accomplish this purpose, sufficient extension is to be made in the same manner as in the foregoing cases, just to dislodge the bone from the place which it occupies; then, while an assistant draws upward the sheet, placed a little below the trochanters, the surgeon is to make a lever of the bone by depressing the condyles.

DISLOCATIONS OF THE PATELLA.

The patella is sometimes dislocated outwards; but, very rarely inwards. A considerable relaxation of the inferior ligament of the patella may occasion a predisposition to this kind of accident.

The reduction is a thing most easily accomplished, as soon as the extensor muscles, and ligament of the patella, have been relaxed by a proper position. The joint is to be kept from inflaming by applying the saturnine lotion, and, if necessary, bleeding and purging the patient. If the patella should seem likely to slip out of its situation again, a roller and a piece of soap plaster will be proper.

DISLOCATIONS OF THE KNEE.

The upper head of the tibia can hardly be completely luxated, without a laceration of the soft parts, and integuments, in such a degree, that the limb could not well be preserved. The leg is sometimes twisted outward, and this may happen without any rupture of the crucial ligaments, the internal lateral ligament being the only one broken. On the other hand, when the bones of the leg are twisted inward, the crucial ligaments, and external ligament, must inevitably be ruptured.

These cases are, for the most part, very easy of reduction. The joint should afterwards be kept perfectly quiet, for several weeks. However, many practitioners would be advocates for gently moving the joint occasionally, in order to prevent the formation of adhesions within the capsular ligament.

DISLOCATIONS OF THE ANKLE.

I have already noticed, in the chapter on particular fractures, the dislocation of the foot outward, in which case, the whole weight of the body being transmitted to the slender fibula, this bone is at the same time most commonly fractured. The occurrence is attended with a rupture of the internal lateral ligament. Mr. Pott has taken particular notice of this accident in his remarks on fractures. The foot may sometimes be luxated inward, and the external lateral ligament be broken. Occasionally, the foot is thrown forward, so that the narrow part of the astragalus becomes situated before the space between the two malleoli. This case is very difficult to manage, in consequence of the powerful manner, in which the muscles of the calf of the leg draw up the heel, and displace the bones. This event is more difficult to prevent, because the steadiness of the joint is not at all maintained by the lateral ligaments, which are both in general ruptured.

The dislocation of the foot inwards happens rather more frequently, than the luxation outwards, which is much prevented by the malleolus externus descending so low down.

Dislocations of the ankle are rendered much more perilous, when they are attended with a wound leading into the joint, However, compound dislocations, and fractures, have already been noticed in the first part of the work, and I shall not now expatiate on the subject.

In reducing dislocations of the ankle, the strong muscles of the calf of the leg should always be relaxed. When the reduction is accomplished, the leg ought to be put in splints, and placed on its outside in a bent position, just as if the case were a fracture,

CHAP. LXXVII.

RUPTURE OF THE TENDO ACHILLIS.

EVERY one, at all initiated in anatomical studies, is well aware, that the tendo Achillis is that great and powerful sinew, which is formed by the junction of the gastrocnemius and soleus muscles, and which proceeds from the lower part of the calf of the leg to be inserted into the os calcis.

I need hardly observe, that the tendon in question is liable to be completely divided, in cases of wounds. My particular object is now to treat of a kind of accident, which is of a much more common nature, viz. the rupture of this tendon by the violent action of the gastrocnemius and soleus muscles, in dancing, jumping, and other exertions. Whether the tendo Achillis be cut across, or ruptured, the patient will certainly remain a cripple for life, unless the surgeon take care to bring the two ends of the sinew near each other, so as to afford them an opportunity of growing together again. The chief difference in the two cases is, that in one, the integuments are divided, while, in the other, they are not.

The tendo Achillis is so superficial, large, and obvious to the touch, that, when it is ruptured, the accident may always be most easily discovered. At the moment of its occurrence, the patient usually hears a noise, like that of the smack of a whip, or of a nut-shell breaking under his heel, and he immediately becomes either unable to stand and walk, or only capable of performing these functions with extreme pain and difficulty. The surgeon, when he examines the part, may always feel a manifest interspace between the two ends of the tendon, which interspace is increased by bending, and diminished by extending the foot.

Since none of the flexor muscles are concerned, the patient retains the faculty of bending his foot; indeed, his power of extending it is not altogether lost, because the peronei muscles may contribute to this effect.

TREATMENT.

The objects in the treatment are exceedingly simple and obvious: viz. to bring the ends of the ruptured tendon into reciprocal contact, and to retain them in this state, until they have grown together again. The first mentioned indication may be easily accomplished, by completely extending the foot; but, the second desideratum, or that of keeping the ends of the tendon for a sufficient time continually in a state of apposition, is attended with more difficulty.

The upper part of the tendon is drawn away from the lower one, by the contraction of the gastrocnemius and soleus muscles; while the lower portion itself can only be separated from the upper one by flexion of the foot.

These considerations make it evident, that the surgeon's chief aim should be to place the foot in an unalterable state of extension, and to counteract, as far as it is in his power, the action of the above muscles.

The action of the muscles may be opposed: 1. By keeping these powers in a continual state of relaxation. For this purpose, the leg must be kept half bent upon the thigh. 2. By applying methodical pressure to the muscles; methodical, because it is to operate on the fleshy portion of the muscles, and not on the tendon, the ends of which being depressed by it, would be separated from each other, and instead of growing together, would unite to the subjacent parts. The pressure should also operate so as to prevent the ends of the tendon from inclining either to the right, or left.

The following was the plan, which the celebrated Desault used to follow, in treating the ruptured tendo Achillis, and the method was expressly designed for fulfilling all the abovementioned indications.

After the ends of the tendon had been brought into contact, by moderate flexion of the knee, and complete extension of the foot, Desault used to fill up the hollows, on each side of the tendon, with soft lint and compresses. The roller, applied to the limb, made as much pressure on these compresses, as on the tendon, and hence, this part could not be depressed too much against the subjacent parts. Desault next took a compress, about two inches broad, and long enough to reach from the toes to the middle of the thigh, and placed it under the foot, over the back of the leg, and lower part of the thigh. He then began to apply a few circles of a roller round the end of the foot, so as to fix the lower extremity of the longitudinal compress. After covering the whole foot with the roller, he used to make the bandage describe the figure of 8, passing it under the foot, and across the place where the tendon was ruptured, and the method was finished by encircling the limb upward, with the roller, as far as the upper end of the longitudinal compress.

Since the time of Petit, mechanical contrivances have generally been employed for keeping the leg continually in a proper position, during the treatment of a ruptured tendo Achillis. Perhaps, to the practical surgeon, they will seem the most eligible. The mode, which Dr. Alexander Monro followed, when he met with this accident in his own person, is a very good one, and a short account of the case will afford sufficient information, in regard to the principles, on which any mechanical apparatus ought to be constructed and applied.

Dr. Monro, suspecting what had happened, extended his left foot, to which the occurrence had taken place, as strongly as he could with his right hand, while, with the left, he pressed the muscles of the calf downward, so as to bring the ends of the broken tendon as near together as possible. In this position he sat, until two surgeons came to his assistance. They applied compresses, and a bent board, to the upper part of the foot, and forepart of the leg, both which they kept, as nearly as possible, in a straight line, by a tight bandage, made with a long roller. But, as this mode of dressing soon became very uneasy, it was changed for the following one. A foot-sock, or slipper, was made of double quilted ticking, from the heel of which a belt or strap projected, of sufficient length to come up over the calf of the leg. A strong piece, of the same materials, was prepared, of sufficient breadth to surround the calf, and this was fastened with lacings. On the back part of this was a buckle, through which the strap of the foot-sock was passed, so that the foot could be extended, and the calf brought down at pleasure. The leg and foot were wrapt up in soft flannel, fumigated with benzoin, and the bandage was kept on day and night, the belt being made tighter, when the doctor was about to go to sleep, and loosened when he was awake, and on his guard. For a fortnight, he did not move his foot and leg at all; but, was conveyed in a chair on castors from one part of the room to another. After this, he began to move the ankle-joint, but, in such a gentle manner, as not to give any pain. The degree of motion was gradually increased, as the tendon became capable of bearing it, care being taken to stop, when the motion began to create uneasiness. The affected limb was moved in this way, for half an hour at a time. In a few days, the hollow, between the separated ends of the tendon, became imperceptible, though the part continued soft much longer. It became, however, gradually thicker and harder, until a knot was at last formed in it, apparently of a cartilaginous nature. Though this was at first as large as a middling plum, and gradually became softer and smaller, yet it did not disappear entirely. Having occasion to go out six weeks after the accident, the doctor put on a pair of shoes, with heels two inches high, and contrived a steel machine to keep his foot in the proper position. This machine, however, he afterwards changed for another, made of the same materials as the former. It was not till five months after the accident, that he thought proper to lay aside all assistance, and to put the strength of the tendon to a trial.

THE END

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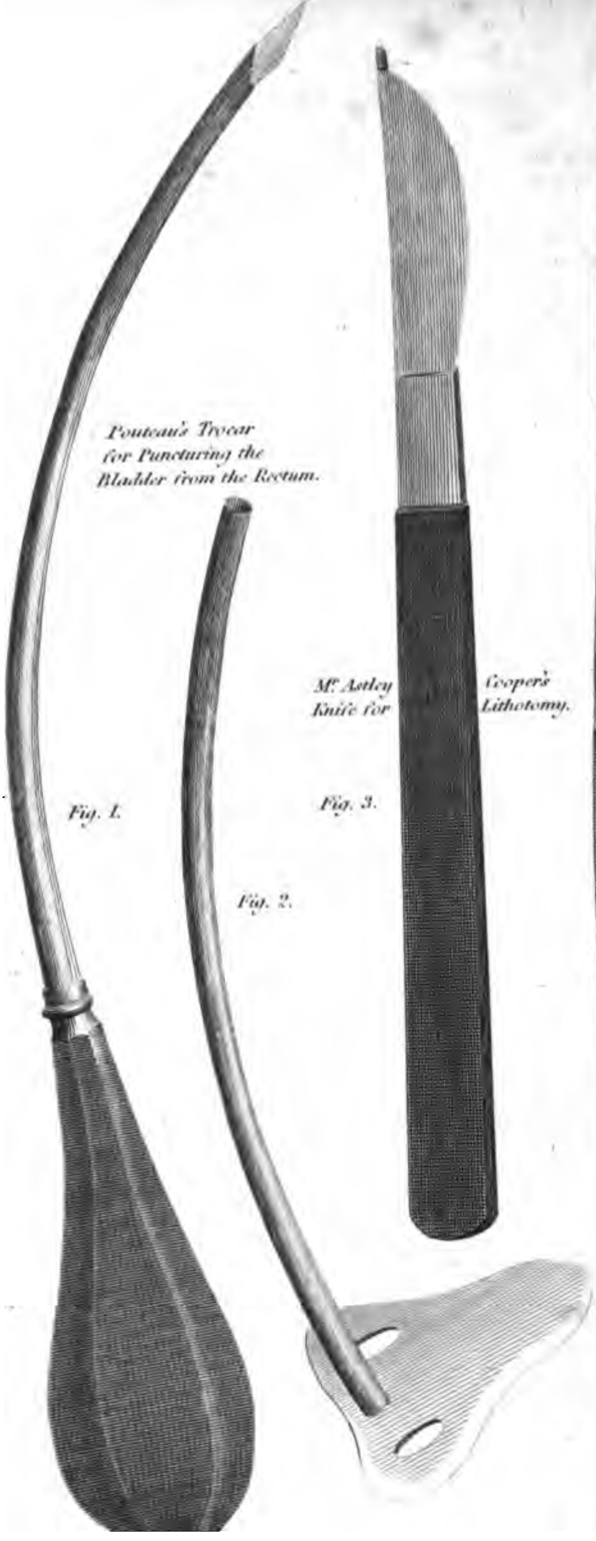


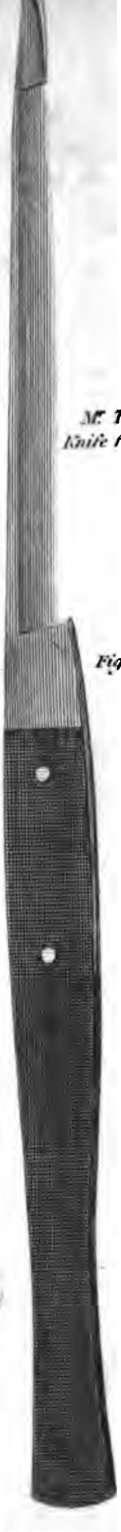
Pouteau's Trocar for Puncturing the Bladder from the Rectum.

Fig. 1.

Fig. 2.

Mr. Astley Cooper's Knife for Lithotomy.

Fig. 3.



Mr. Thomas Knife for Lith

Fig. 4.

Mr. Henry Earle's Instrument for breaking Stones in the Bladder.

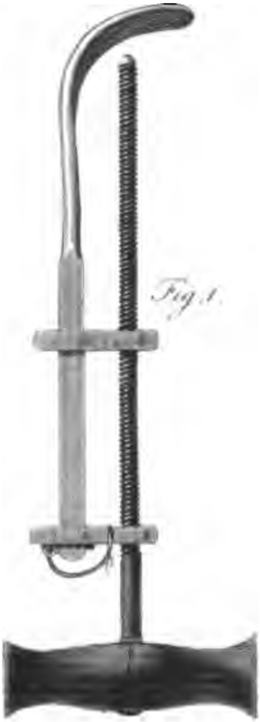


Fig. 1.

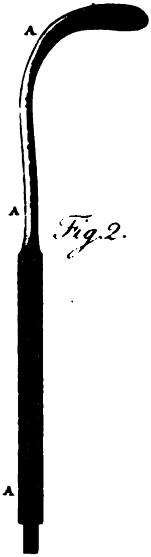


Fig. 2.

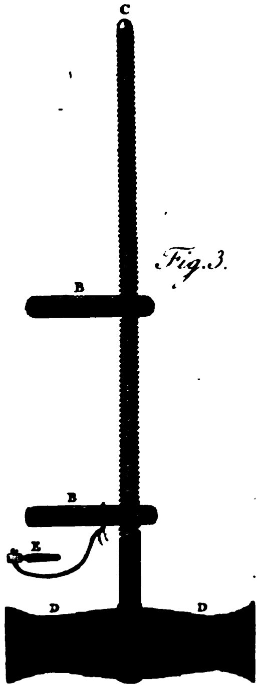
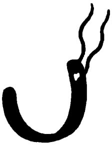


Fig. 3.

Needle for carrying
a ligature under a deep artery,
constructed on Mr. J. Watt's plan.



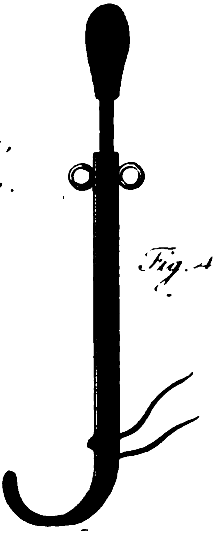


Fig. 4.

Mutlow sculp.

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